Smithsonian

OVEMBER 1999

Big Sur

Life on the Edge

[PAGE 98]

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IN HIS QUEST TO REACH THE PLANET'S FOURTEEN HIGHEST PEAKS, ED VIESTURS RELIES ON HIS EXPERIENCE, STAMINA AND WILL.

AND HIS ROLEX.

Asked why he monitors the timing of his ascent and descent so meticulously with his Explorer II, Viesturs doesn't mince words. "Reaching the summit is optional," he says. "Getting back down isn't."

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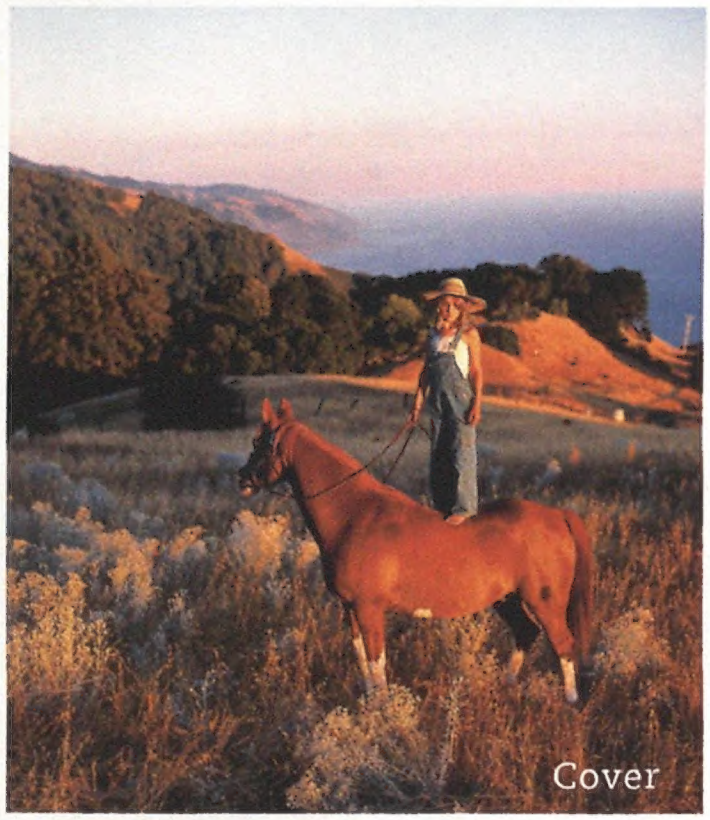
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Cover Isabella Hacker, 8, takes in the scenery with her horse, Zinny—short for Zinfandel—at her parents' ranch on Partington Ridge. The area, in Big Sur's South Coast section, is known for its ocean vistas and writer Henry Miller, a past resident.
PHOTOGRAPH BY CATHERINE KARNOW

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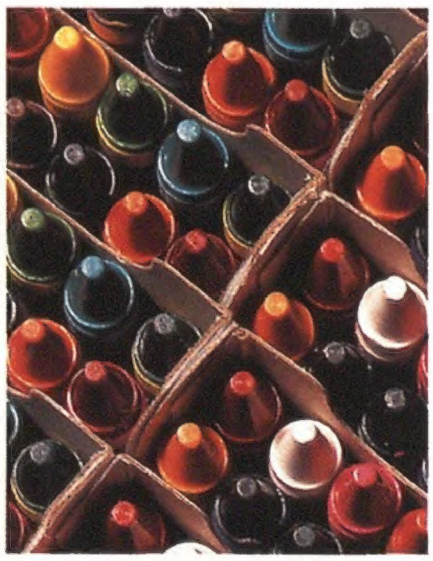
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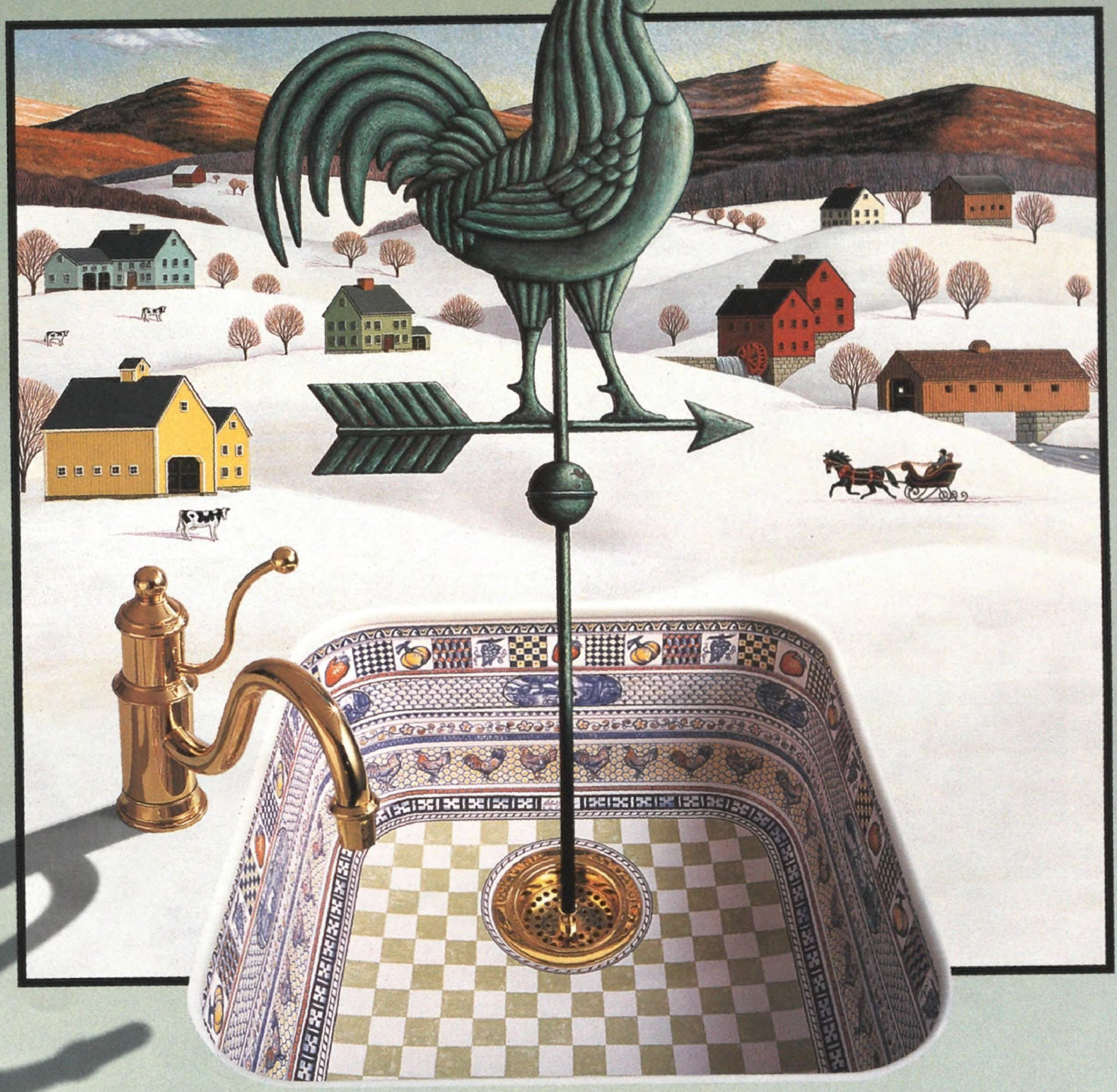
Charles Purvis, Photographer
"A New Direction"



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"Dennis is busy running his own construction business and I'm busy because we're a very active family," says Kathleen.

"Managing our investments became too time consuming," says Dennis.

"The stress load was building," adds Kathleen.

So what did you do?

"We found an independent investment manager who works with us as a team," says Kathleen. "She's helping us plan for our goals—college for the boys, retirement..."

So you're happy with your choice?

"Absolutely," says Kathleen. "She's a wonderful teacher. We feel very comfortable."

"She's helped us go in the direction we want to go in," Dennis adds.

Getting an independent investment advisor can be smart. Especially if you're at the point in your life where you could use some ongoing advice.

Kathleen says, "Our investment manager has a lot of experience. She's just what we needed."

"We really trust her," says Dennis.

"She even spent two hours with our boys explaining how their college money is invested," adds Kathleen.

Any last thoughts on your advisor?

"It's the best decision we've made in the past couple years," says Dennis. "It's de-stressed my life and added to our quality of life. Ultimately, we hope it will help us reach our goals, not only for ourselves but for our family."

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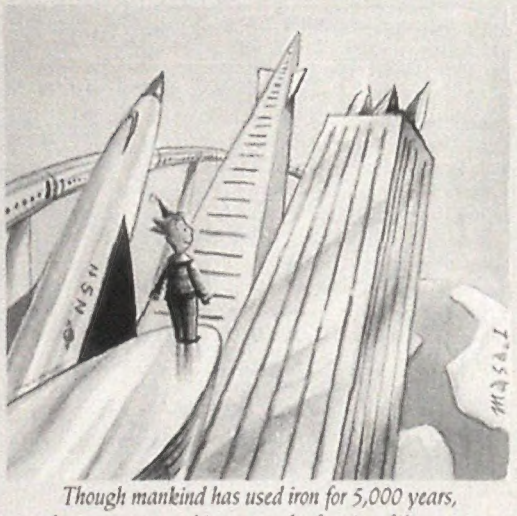

Though mankind has used iron for 5,000 years, this common metal is now at the frontier of discovery, which is revealing many fantastic properties.

Toward Rust-Free Iron

By Yoshiyuki Matsuo

Everyone knows that iron rusts after awhile. However, this basic assumption is being challenged by leading-edge research. At the Research Institute for Iron, Steel, and Other Metals in Sendai, Japan, scientists have developed iron which, though refined in August of 1988, has no rust at all and shines like a precious metal. The secret of rustless iron lies in an extremely high 99.995% refinement level.

The latest experiments show that iron's tendency to rust is reduced simply by reducing the level of impurities. The creation of alloys calls for adding elements, while the making of pure iron is actually a subtracting process. In fact, all the steel products we use today are essentially made of a variety of iron alloys. Steel sheets used in an autobody have high workability, whereas cast iron used in the engine is highly rigid and strong. Though made of the same material, steel products can demonstrate totally different properties. This is the reason why iron has been called by many the "king of raw materials."

We still haven't obtained totally pure iron. The highest purity to date is 99.995% pure. This level of purity is six factors of ten lower than 99.999999999% purity of the silicon used for electronic substrates. However, 99.995% pure iron is already showing us some amazing truths. For example, tension tests at an extremely low temperature of only 4.2 degrees above absolute zero show plastic deformation and no splitting.

Mankind first obtained iron around 3000 B.C. However iron is even now a technological frontier hiding an infinity of possibilities.

About the Author:
Yoshiyuki Matsuo is a senior editor for Nikkei Science, *the Japanese version of* Scientific American. *His special interests in material science include quasicrystals, C_{60}, and superconductors.*

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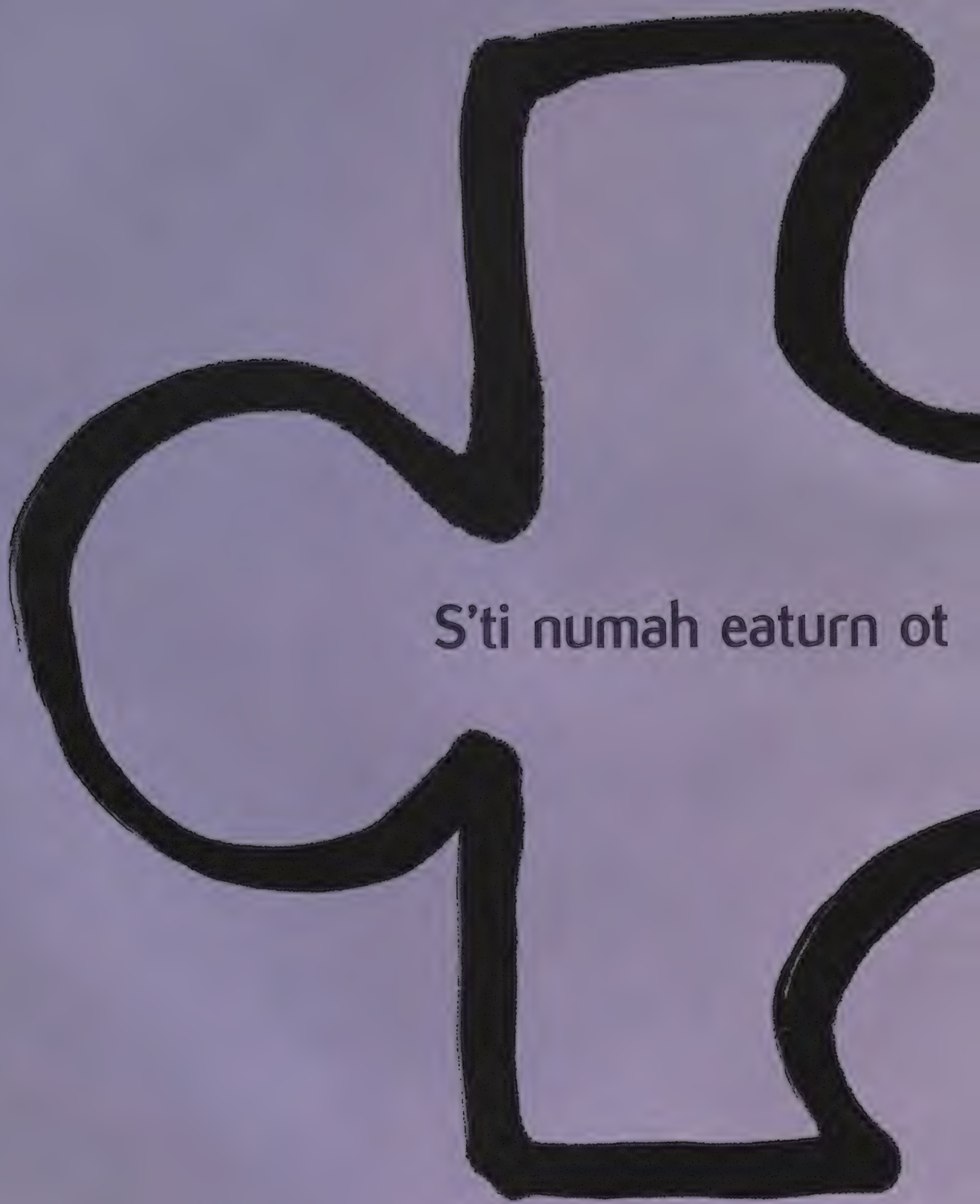

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PERSPECTIVES

A Passion for Learning

THE OPPORTUNITY TO BROADEN ONE'S HORIZONS AT THE SMITHSONIAN IS A JOB PERK TO BE RELISHED

DEPARTURES EVOKE MEMORIES AND THE DESIRE TO sum up. This column is a personal retrospective on some of the exhibitions at the Smithsonian that opened new worlds for me during my tenure. Space permits discussion of only a few of many that have broadened my personal knowledge.

I came to the Smithsonian confident that, given prior experience, I could deal comfortably with topics on American history, natural history, American art through 1950, photography and technology. I have enjoyed exhibitions on all these subjects, but much to my delight, I learned the most in areas about which I was least knowledgeable.

Start with the Hirshhorn Museum and Sculpture Garden. Frankly, contemporary art had largely been a mystery to me. But viewing the work of a stream of contemporary artists has broadened my understanding immensely. I think of artists like Bruce Nauman (whose mixed-media pieces were accompanied by labels explaining his intent), Jeff Wall, Brice Marden, Carlos Alfonzo and Chuck Close. I have also been fortunate to have the expert guidance of Director Jim Demetrion and Hirshhorn curators.

I go next to the Freer and Sackler galleries. Again, my experience with Asian paintings and objects had been minimal. But repeated visits, usually accompanied by Director Milo Beach or curators, have introduced me to a new world. I remember most particularly "The Jewel and the Rose: Art for Shah-Jahan," "King of the World: A Mughal Manuscript from the Royal Library, Windsor Castle" (which I wrote about in October 1997) and "Devi: The Great Goddess."

African art also was a new experience for me. Roslyn Walker, director of the National Museum of African Art, skillfully revealed to me the meaning of African objects through such exhibitions as "Memory: Luba Art and the Making of History," "Olowe of Ise: A Yoruba Sculptor to Kings" and "Ancient Nubia: Egypt's Rival in Africa."

My education has also been enriched in fields that I generally comprehend. American history is the primary subject matter of both the National Museum of American History and the National Portrait Gallery. Both have a number of permanent exhibitions such as "First Ladies: Political Role and Public Image" and the "Hall of Presidents." Among the recent shows at American History, I especially enjoyed "Blue Guitars," "Communities in a Changing Nation: The Promise of 19th-Century America" and "Between a Rock and a Hard Place: A History of American Sweatshops, 1820-Present." The latter two concern controversial subjects, but both exhibitions were balanced, treating complex events in the context of their times while presenting a glimpse of changes that ensued.

The National Portrait Gallery often presents exhibitions that explore meaningful American phenomena centered on important people. A sampling includes: "Mathew Brady Portraits: Images as History, Photography as Art," "Theodore Roosevelt: Icon of the American Century" and "Paul Robeson: Artist and Citizen." These installations deepened my understanding of American history.

Exhibitions can stimulate memories and, as with fine drama, produce meaningful emotional responses. Two that strongly affected me were "Red, Hot & Blue: A Salute to American Musicals" (a joint exhibition of NPG and NMAH) and "World War II: Sharing Memories" at American History. I have written about both before in this column, stressing the value of exhibitions that evoke deep nostalgia.

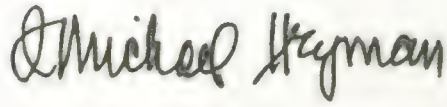
While the examples given suffice to make the point, I want to mention a sampling of exhibitions in other museums that have had considerable impact.

At the National Air and Space Museum: "How Things Fly" (I finally understand the phenomenon), "Space Race" (a chronicle of progress through international competition) and "Enola Gay" (an unwelcome personal lesson in crisis management).

At the National Museum of American Art: "Metropolitan Lives: The Ashcan Artists and Their New York" and "Posters American Style" (history through poster art).

At the National Museum of Natural History: the fabulous new Janet Annenberg Hooker Hall of Geology, Gems, and Minerals, and "Landscape Kimonos by Itchiku Kubota."

Space does not allow me to identify significant exhibitions in our other museums and exhibition places. But the point I have sought to make is that an intimate connection with the Smithsonian affords the Secretary many opportunities for learning and stimulation.



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KITCHENS OF THE FUTURE

"WILL THE KITCHEN PLEASE SHUT UP!" by Richard Wolkomir, in the September 1999 issue, may possibly be the most horrifying piece you have ever printed. With their talking utensils and self-restocking refrigerators, the folk at the Massachusetts Institute of Technology Media Laboratory seem intent on creating things that think for people who don't.

Counter intelligence, indeed.

Charles Palmer
Rohnert Park, California

I HAD TO BE IMPRESSED WITH MIT'S efforts to bring the wonders of computers into the kitchen. When I was at MIT in the '50s, they were trying to create mechanical pets that would react emotionally with people.

Homemakers have coped with such calamities as a quickly spreading puddle of water on the floor or flames leaping high above the frying pan. These crises will become minor nuisances as computers are programmed to recognize them and set countermeasures in motion.

But mystifying problems can arise. I anticipate someday hearing a calm voice saying, "This coffeepot has performed an illegal operation and will be shut down."

Ernest B. Leach
Mayfield Heights, Ohio

FOR THOSE OF US WHO LOVE COOKing, "Will the Kitchen Please Shut Up!" is aptly titled.

I escape to the kitchen to do my creative bit without any trepidation. Sometimes I mix ingredients without following any recipe, just for the pleasure of devising something new, edible or not. Hearing a disembodied voice telling me, "You goofed," or offering some other criticism because the chip wasn't programmed with imagination would be sobering.

Can't we have a little silence in this brave new world?

Yvonne R. Freund
Bellevue, Washington

EGYPTIAN ART

ON PAGE 118 OF THE ARTICLE "Out of Egypt: Art in the Age of the Pyramids" by Bennett Schiff, the prince in the stele unmistakably has two left feet and hands. The artist appears sufficiently sophisticated to preclude a random error for picturing the prince's extremities this way.

Paul Dest
Ontario, California

A convention of Egyptian art dictated that each part of the human body be represented in its most easily recognizable form. The left hand and left foot were sometimes part of that convention. Ed.

IN YOUR OTHERWISE EXCELLENT ARticle on Old Kingdom art, you incorrectly identified the Egyptian Museum in Cairo. Harry N. Abrams, Inc., just published the lavishly illustrated book of the museum, *Egyptian Treasures from the Egyptian Museum in Cairo*.

We are also distributing the catalogue to the Metropolitan Museum of Art's dazzling show "Egyptian Art in the Age of the Pyramids."

Carole Morgan
Harry N. Abrams, Inc.
New York, New York

WHAT AN ASTOUNDING STATUE ON the cover of the September issue. I was struck by the contentment and affection of King Menkaure and his queen. American artist Grant Wood might have called the graywacke sculpture "Egyptian Gothic."

Charles Neuman
Arlington Heights, Illinois

DURIANS

YOU DESERVE SOME KIND OF AWARD for coming up with obscure subjects. This time you gave us "Durians Smell Awful—But the Taste Is Heavenly" by Henry Genthe, a story about a very expensive fruit that smells like summer roadkill, is banned from public places but is almost addictive to those who sample it. You made me wonder who the first brave soul was to try this stinking oddity and why.

Linda R. Anson
Glenrock, Wyoming

IN THE 1960S, MY FATHER WAS BASED in Singapore and marketed space on American President Lines freighters for APL's clients throughout Southeast Asia. Walls Ice Cream of Great Britain did not have facilities in Asia for developing new flavors, so they shipped a huge quantity of durians to Liverpool for processing, but no ice cream was shipped back. My father inquired and was told that "the fruit arrived rotten and could not be used."

The following season, more durians were sent, and again, no ice cream came back. The third year my father advised by telex that if the rot could be identified by the pungent odor of the fruit, "go ahead and make ice cream." A few months later, the Cold

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Storage supermarkets started selling Walls Durian Ice Cream.

Tracy Cotton Richard
San Francisco, California

WHEN I WAS INTRODUCED TO DURIan in the Philippines, I was told that "it smells like hell but tastes like heaven." When I tell people about durian, I say, "It smells like hell but doesn't taste as bad as it smells."

Phillip Nicholls
New Haven, Connecticut

THE NEXT TIME YOU HAVE AN ARTIcle like this, you should include a scratch-and-sniff card.

John Dolewa
Saco, Maine

PHENOMENA, COMMENT & NOTES

THE CAPTION BENEATH THE PHOTOgraph of the gray wolf in John P. Wiley, Jr.'s column "A Census of the Wild" did not include Montana's Glacier National Park as one of the sites in which the species has returned "of its own accord." The park maintains an ecosystem of all the original animal species, with the exception of buffalo, that resided in the area when the first Europeans arrived.

Steven Anolik
Woodmere, New York

In 1986, Glacier National Park documented its first litter of pups, and it now has approximately 30 to 40 gray wolves living in two or three packs. Outside the park, the gray wolf has reestablished itself in northwestern Montana and has a population of about a half-dozen packs. Ed.

THE OBJECT AT HAND

I GREATLY ENJOYED LEARNING ABOUT Gail Borden's condensed-milk phase in Carolyn Hughes Crowley's "The Man Who Invented Elsie, the Borden Cow." I had only been aware of his patriotism during the Texas revolution. Gail Borden, Thomas H. Borden and Joseph Baker founded and began publishing the *Telegraph and Texas Register* on October 10, 1835, in San

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Felipe de Austin, where Stephen F. Austin had earlier established the headquarters for his colony. Gail Borden printed the Republic of Texas' March 2, 1836, declaration of independence from Mexico. On March 17, 1836, the paper ran the first account of the fall of the Alamo, a story that was picked up by the Eastern press and garnered support for the settlers.

After Texas won its independence, Borden helped survey and lay out the streets of Houston and reestablished his newspaper there.

Richard L. Curilla
Bracketville, Texas

ARIZONA POISON AND DRUG INFORMATION CENTER

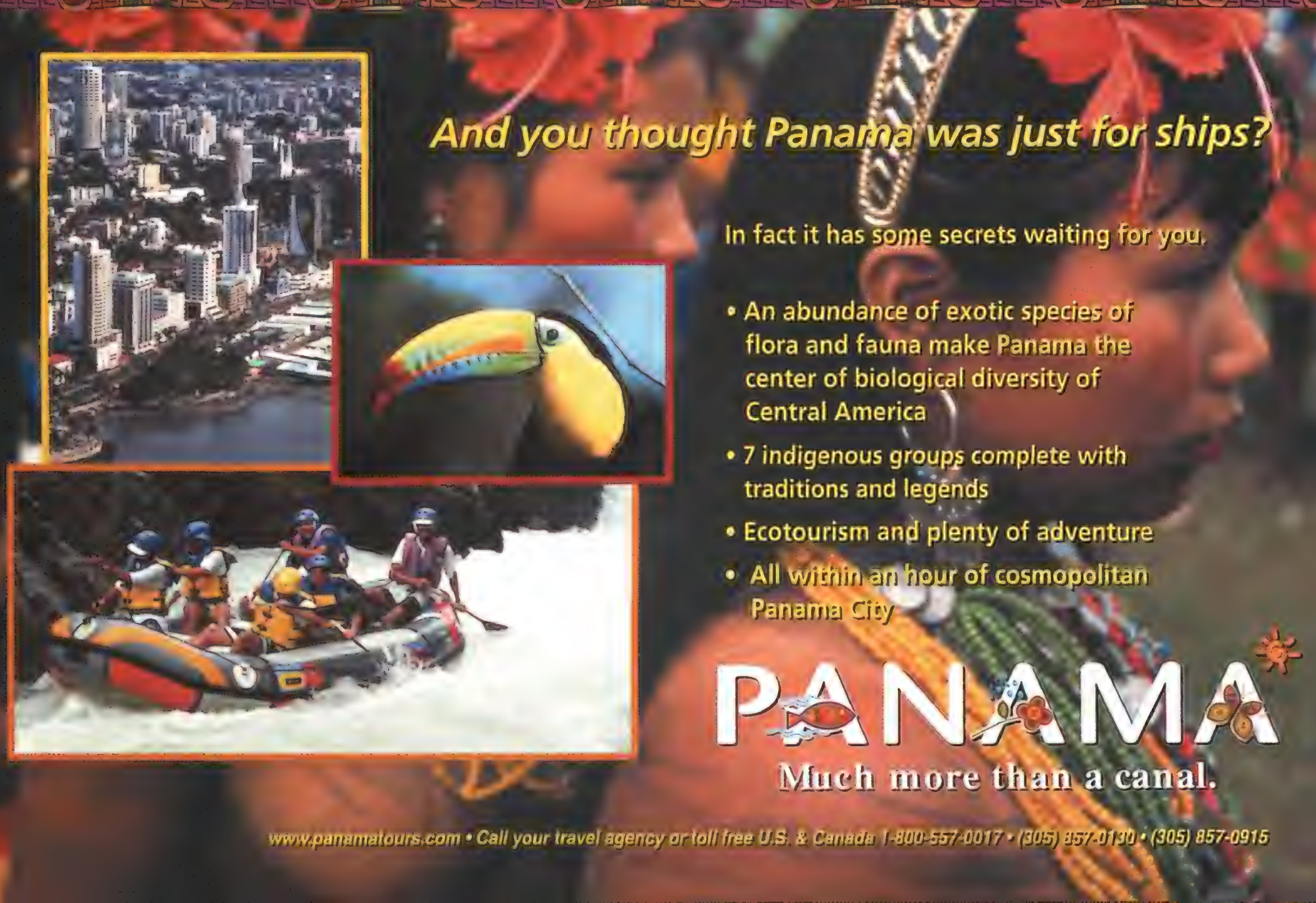
AFTER READING "SOMETHING JUST Bit You?" by Steve Kemper, I pulled out an 1861 article by my great-grandfather, Dr. B.J.D. Irwin, about the efficacy of a folk remedy for snakebites. Dr. Irwin was a surgeon in the U.S. Army, and while stationed at Fort Buchanan, Arizona, he had never heard of anyone in that part of the country dying of rattlesnake bites, despite there being several varieties of the species. The locals directed him to the remedy they used against the bite of coral snakes, rattlers and other noxious reptiles, the sting of scorpions and "a host of other hideous creatures": an herb of "frail, delicate appearance" called *Euphorbia prostrata*.

In his experiments on dogs that had been bitten by rattlesnakes, he orally administered the fresh juice of the plant, which he had heavily diluted with water. The physiological effects, he wrote, were "emetic and cathartic." All the dogs rapidly improved and completely recovered.

By the way, in 1863, Dr. Irwin arranged for the 1,400-pound Great Tucson Meteorite to be shipped to the Smithsonian Institution. More than 100 years earlier, Spanish missionaries had tried to carry it from the Sierra Madre to the closest port so they could transport it to Spain but found the task daunting. The mostly iron meteorite was set up vertically in the village of Tucson and used as an anvil. In 1857, Dr. Irwin found it half-buried in a street and claimed it for the Smithsonian. It is also known as the Signet Meteorite because it looks like an immense signet ring.

John D'Arcy Irwin
Waretown, New Jersey

Euphorbia prostrata has been shown to reduce edema, and it contains a small amount of anti-inflammatory properties. The Great Tucson Meteorite is in the collection of the Smithsonian's National Museum of Natural History. Ed.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GALVESTON HURRICANE

"FOR A WHILE . . . IT WAS FUN" BY Stephen Fox reminded me of my grandmother's friend who struggled for hours against the roiling waves of Galveston's 1900 hurricane. Finally, someone pulled her from the flood and helped her to a still-standing house. She had no idea where her husband was. When the storm was over, my grandmother's friend and other women formed an assembly line of biscuit-makers. After hours of baking, she looked up and saw a buck-naked man, save his celluloid collar. It was moments before she recognized him as her husband.

Varina Ann Herod Bianchi
Conroe, Texas

ISENHEIM ALTARPIECE

STANLEY MEISLER'S "A MASTERPIECE Born of Saint Anthony's Fire" had special meaning for me. Before I immigrated to the United States from Hungary in 1957, I had spent six years in prison camps because of my pro-American and pro-Christian convictions. In 1950, the Communist secret police in Budapest arrested me because I had worked closely with Joseph Cardinal Mindszenty. They wanted me to lie about him. I would not. They tortured me, especially during the first year, in my small, windowless interrogation cell. I was prepared to commit suicide, but as I was considering this, I lifted my eyes and found a rendering of the center panel of the *Isenheim Altarpiece*. It appeared to have been carved by fingernail into the cell wall and painted with blood.

I knew that Matthias Grünewald had created his shockingly expressive *Crucifixion* to comfort the terminally ill people in the hospital by reminding them that "He suffered more." The message gave me back my spiritual and physical strength, enabling me to survive three years of solitary confinement and three years in a coal mining work camp.

Alfonz Lengyel
Sarasota, Florida

WRITE TO SMITHSONIAN

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PHENOMENA

COMMENT & NOTES

A Darkness in Donora

WHEN SMOG KILLED 20 PEOPLE IN A PENNSYLVANIA MILL TOWN IN 1948, THE CLEAN AIR MOVEMENT GOT ITS START

BY EDWIN KIESTER, JR.

Six months after the smog episode, smoke rose from the stacks at the Donora Zinc Works in a test that was part of an investigation.

"IT WAS SO BAD," JERRY CAMPA, A DONORA, PENNSYLVANIA, restaurateur recalls, "that I'd accidentally step off the curb and turn my ankle because I couldn't see my feet." The acrid, yellowish gray blanket that began to smother the Monongahela River mill town in late October 1948 was more suffocating than anything any Donoran had ever seen—or inhaled—in the past. Before a rainstorm washed the ugly soup away five days later, 20 people had died or would soon succumb and nearly 6,000 of the 14,000 population had been sickened.

"Before Donora," declares Marcia Spink, associate director for air programs for the U.S. Environmental Protection Agency's Region III office in Philadelphia, "people thought of smog as a nuisance. It made your shirts dirty. The Donora tragedy was a wake-up call. People realized smog could kill."

When I was growing up in western Pennsylvania, grime and dirty air were facts of life. We walked home for lunch with streetlights still blazing; my mother washed the living-room curtains almost every week. But memories of the Great Depression were still vivid and smog meant prosperity.

When, as a cub reporter in Pittsburgh, I phoned in a police report that gasping, coughing Donorans were swamping the local hospitals, the rewrite man shrugged it off. "People are always coughing in Donora," he said. This was different. Before the evening ended, I was phoning every Donora official I could locate, and the rewrite man was beating out a story about a public health and environmental disaster.

"Frightening, scary," recalls white-haired Eileen Loftus. She was a nurse at the American Steel & Wire Company, whose blast furnaces and zinc works stretched along the Monongahela and employed most of the town, and one of the 70- and 80-year-olds who shared recollections one sunshiny morning half a century later. You couldn't see the Halloween parade, they remembered—"just shadows moving through the gloom," one woman said. A football game against rival Monongahela was almost invisible, with teams running the ball because they couldn't see it in the air.

"About 4 o'clock Friday," Loftus recalled, "a worker staggered in, gasping. I had him lie down and gave him oxygen. Then another man came in, and another." By early evening, every bed and examining table was occupied by a

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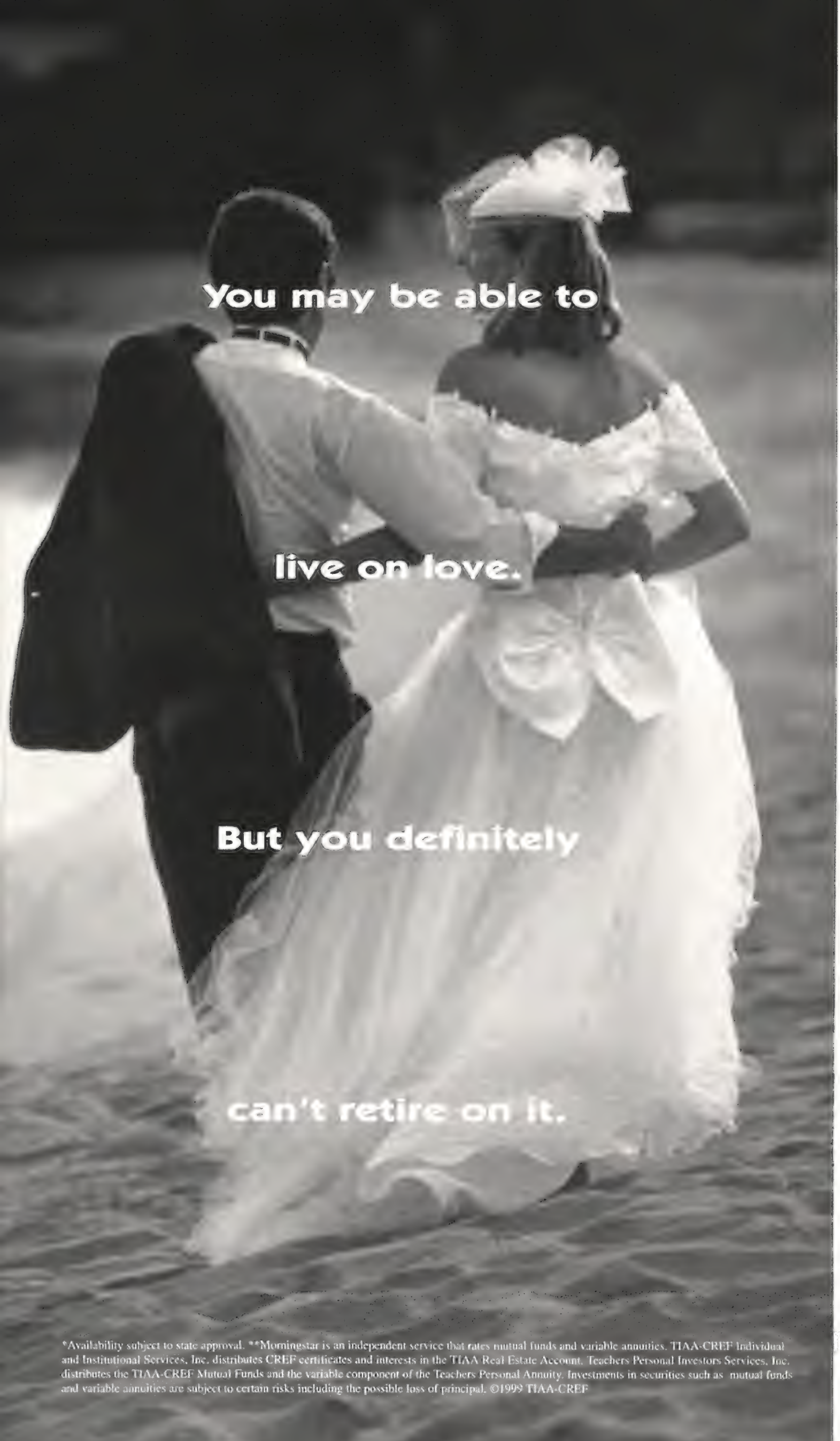

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Streetlights were on night and day during the five-day crisis. At the smog's worst, an ambulance could not move even with someone on foot to guide it.

wheezing and often panicky worker.

Bill Schempp, now a vigorous, wiry, 82-year-old, was the fire department's oxygen specialist. He remembers receiving a call early Sunday morning from the fire station, which was being deluged with desperate requests for breathing assistance. Schempp picked up three addresses and started off up Sixth Street.

To retrace Schempp's path through the smog, even on a clear, bright day, is to appreciate his heroic effort. Sixth Street rises at a breathtakingly steep angle. Driving was out of the question; even the town's ambulance could only creep through the smog with a pedestrian ahead to mark the way. Carrying an 18-inch tank of oxygen, an inhalation mask and hoses, he groped blindly uphill. "I knew that street like the back of my hand," he recalls. "But it took me an hour to cover what I could normally do in ten minutes."

On arrival, Schempp applied the mask over the nose and mouth of a middle-aged, asthmatic worker and administered a one-minute infusion of pure oxygen. After five minutes, Schempp gave a second round, then a third. Then, to conserve his life-giving supply for others, he left, to the anguished protests of the family. "They said, 'You're taking his life away!'"

The first death occurred Friday. By Saturday the three funeral homes quickly had more corpses than they could handle. The town's eight physicians hurried from case to case, able to spend only a few minutes at each bedside. Pharmacists dispensed medications by the handful. The town set up a temporary morgue.

Yet the steel mill and the zinc works continued to operate, stacks steadily spewing more fumes into the loaded atmosphere. On Sunday morning, on orders from the parent company, U.S. Steel, the zinc works closed down. While expressing sympathy for the victims, the superintendent disclaimed responsibility, declaring that the zinc works had been safely using the same procedures since 1915.

Thanks to everyone from my once-skeptical rewrite man to national newscasters, Donora now received so much attention that telephone lines were swamped. Over the next months, state and federal investigators interviewed every third household, set up air-quality monitoring sites, checked medical records and vital statistics, and brought in meteorological and biological research teams. In 1949, the U.S. Public Health Service issued a 173-page report, "Air Pollution in Donora, Pa.: Epidemiology of the Unusual Smog Episode of October 1948."

The report counted 5,910 people affected by the smog but failed to name a definite culprit. Donora's topography and a freakish weather pattern were primarily blamed. The town sits on a horseshoe bend in the Monongahela, with steep hills at its back and even steeper ones across the river. Fumes were normally swept out by the prevailing westerly winds. In October 1948, a layer of cold air hung over the valley, trapping the warmer, fume-laden air beneath, a phenomenon called a temperature inversion.

The report satisfied few. Critics noted that the permissible emission levels were for healthy young workers in the plants, not older or ill persons in the community; the dead had all been age 52 or over, most with asthma or heart or lung problems. Absolving the zinc works particularly outraged many; you didn't need science to identify the culprit, a local newspaper declared, "just a pair of reasonably good eyes." Lawsuits (later settled without assessing blame) were filed against American Steel & Wire; citizens' groups grew up to demand stiffer smog regulation.

In 1950, President Harry Truman convened the first national air pollution conference, citing Donora as an example of the need. By present standards, its recommendations were tame, mostly calling for more research, but the precedent of a federal role had been set. In 1963, Congress passed the first Clean Air Act.

The skies are clear over Donora now. Gilmore Cemetery, once so devoid of vegetation that heavy rains often exposed caskets, is again green. The zinc plant closed in 1957, the steel mill a few years later.

But the population has dwindled to 5,900, one-third over age 65. Industrial employment is only 1,100, down from 5,000 in the mill's heyday. Some folks still bitterly blame the air-quality movement for destroying the town.

Justin Shawley represents another view. This 18-year-old University of Pittsburgh freshman persuaded the state to erect a marker memorializing the Donora Smog. "It's wrong to try to ignore this moment," Shawley told me passionately. "That's obliterating the memory of those who died." Or as Marcia Spink says, "People who never heard of Donora owe this town a debt of gratitude."

AP/WORLD WIDE PHOTOS

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Audio Visual Gears Up Long Before Showtime

BY MICHAEL KERNAN

Karen Lawrence, acting chief of the Smithsonian's Audio Visual Branch, and assistant chief Willy Prost take charge behind the scenes at American History's Carmichael Auditorium.

LONGER AGO THAN I CARE TO say, I went to a lecture by the great British humorist Evelyn Waugh in Providence, Rhode Island. The man took the stage and stood behind a lectern, before which was a tall floor mike with a wire leading from its base to the side curtains.

Hardly had Waugh begun to speak, than the mike began very slowly to travel. Eerily, inch by inch, it moved offstage left. Waugh of course saw that it was getting away from him. It did not occur to him to scowl offstage to where presumably someone was pulling on the cord for reasons no one will ever know. He was a man with a lively sense of the ridiculous. (Legend has it that on his first day working for a giant London daily, the paper's owner came by and asked the young man his name. "Waugh," he replied. The owner thought he was making a rude noise and fired him.)

So, undaunted, Waugh started to follow the mike, picking up the lectern and moving along with it. He continued to lecture, though as he neared the curtain his eyes did take on a certain hunted look.

Apparently, audiovisual support should not be left to amateurs. Indeed, the Smithsonian devotes a whole branch of its Office of Physical Plant to audiovisual services.

"On and off the Mall," says acting chief Karen Lawrence, "we serve pretty much the entire Institution. When a client calls and says they're having a five-day conference and will need projectors or video playback, or when the performing arts department says they're bringing in an artist to perform, we provide the sound reinforcement for that. We also make audio and video duplicates if asked."

Adds assistant chief Willy Prost: "Think of us as the events people as opposed to the exhibits people."

When The Smithsonian Associates puts on a concert by the Emerson String Quartet or the Smithsonian Chamber Orchestra, the job is fairly simple. The Audio Visual Branch (A-V) provides a mike for the announcer and a mike for an audio loop for assisted listening.

"They don't want amplification," Prost notes. I silently applaud, recalling the times I have heard recitals ruined by the uncalled-for blowing up of subtle sounds.

A-V has the equipment to cover most needs, and the home office in the National Museum of American History is wonderfully cluttered with boxes and files. Sometimes a Smithsonian sponsor will request, say, the latest data projector, a $12,000 marvel of technology. Who pays for it? Not A-V. Even if the sponsor only needs it once a year, the sponsor and future users must share the cost.

"People think there's a big pile of money in the Castle basement," Lawrence laughs, "but actually we have to pay our own way." So the sponsor comes to A-V with its

KAY CHERNUSH

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"The threshold of pain is 126 decibels, but the technicians can only do what the band lets us."

needs and gets billed for the services. Everything is planned well in advance; "it's not a fire engine operation, though now and then a client won't know himself just when an event is coming up, and then we all scramble."

I ask about horror stories. "We don't have 'em," says Lawrence, even as Prost is saying, "We try to forget 'em." You think about those things the way racecar drivers "remember going into Turn 3 but don't remember flipping end over end," he adds.

Mostly the bad memories involve hurry-up calls for complicated equipment. Once, for Teachers Night at Air and Space, the sponsors asked A-V to rent a special computer. "We had, like, an hour to come up with one, then couldn't get access to the Internet at the designated location. Finally we took it to a classroom and got through."

What about feedback? We have all gone to events where sophisticated sound equipment covers half the stage and the first thing we hear is a horrible screech and everyone thinks, jeez, we can fly to the moon but we can't master the microphone.

"What it is, is this," Prost tells me. "I'm talking into a mike and my voice is coming out of the speaker but I can't hear myself, so I ask them to crank up the sound. So they do and I say, Fine, there I am, and I sing my song and stop. But the amplifier and speaker don't know I've stopped, so they continue to pick up the mike's own signal and send it back to the amplifier. It can be prevented. You can pull back the volume the instant the singing stops, but you need a quick hand."

Prost got into the business naturally. "I was the geeky kid in the fifth grade who figured out how to make the projector work. The movie would break down and the nun would run out to find 'Sister Calamity,' but I would fix it first." After Penn State, he worked for a video firm in Washington, then hired on here in '87 as an intermittent technician, moving up over the years.

Lawrence loved audiovisual stuff in high school, too. At Morgan State, in Maryland, she was assigned to the media center for work-study, and after graduation held A-V posts at Johns Hopkins University, in Baltimore, and other schools. She moved to the Smithsonian in '89.

Technicians on the staff cover a wide range of skills, which have to be matched to their assignments. One is a videographer who specialized in filming surgeries. Some are musicians, some photographers. Most have outside jobs and work here "intermittently."

And as anyone knows who has a home computer, nothing is easy. Running a 35mm film means getting the right aspect ratio (so Anthony Hopkins' round head, for instance, doesn't come out as a matchstick on an anamorphic lens).

Concerts, too, call for special technical skills. A rock group may go to 115 decibels on Prost's sound-level meter, which is the same noise level as a handgun going off. But the handgun noise only lasts a half-second; the music, on the other hand, can go on for a 20-minute set.

"The threshold of pain is 126 decibels," he notes, "but the technicians can only do what the band lets us."

A-V people tend to be invisible. They are the first to arrive and the last to leave, which means they are there maybe even before the sponsors, and still around long afterward to rescue lost gloves.

"We check the site and reconfirm what a client needs," says Lawrence. "Some may say they only need four mikes. Well, what will you plug them in to? And if you have a vocalist, will you need monitors? We speak for those who don't know what to ask."

Before A-V can accept the requests of an outside group, it must first get the approval of the Smithsonian department sponsoring them. As a cost-recovery unit, A-V survives off these events, whose operating costs, and administrative support, equipment repair-and-replacement and personnel costs are paid by the sponsor.

Sometimes the sponsor insists on doing things its own way, in which case A-V issues a disclaimer. ("We've been in this business so long we know how the equipment thinks," says Prost.)

And they hate to see someone coming in with a big amplifier better suited for a football stadium. Recently a gospel group sang at American History, recalls Lawrence, and "even down here in the basement Willy's chair was vibrating." "The band's amplifiers and drums were louder than the vocals," Prost says. "Our challenge was to get the vocals louder than the band."

Another thing to be cleared with the client is how the technicians will look. If it's a VIP event, they may be asked to show up in suit and tie. For an outdoor concert, should they wear shorts? OK, but not cutoffs or gym shorts, and no naughty T-shirts. "Professional casual is the style," laughs Lawrence.

They are not much for outdoor lighting, usually done by contractors. But you never know: when they are called for a job off the Mall, say at the Silver Hill research center, in Maryland, they do site surveys and check out power sources, outlets, available light and the possible need for a generator. Though A-V staff work exclusively for the Smithsonian, their assignments may take them to restaurants and embassies, and other off-Mall locations. "Have equipment, will travel," says Lawrence.

And their hours can run from 5 A.M. to 2 A.M. or beyond. "If you see a Cushman golf cart loaded with stuff running around the Mall at 3 in the morning," Lawrence informs me, "that's us."

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– Billy Rose, Theatrical Producer

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THE OBJECT AT HAND

The Colors of Childhood

CRAYOLA CRAYONS TAKE US ALL BACK WITH THEIR FONDLY REMEMBERED LOOK, SCENT AND FEEL ON PAPER

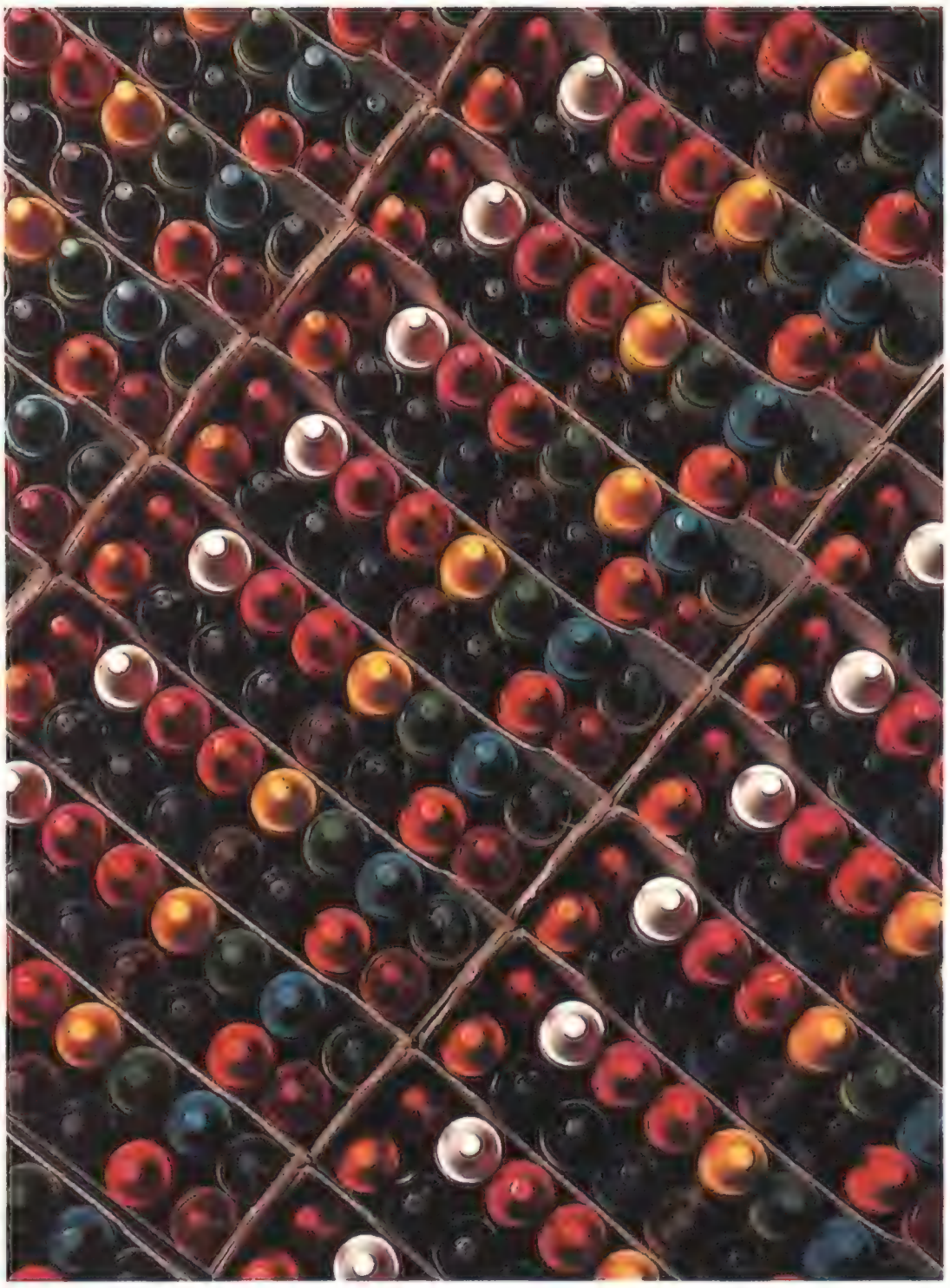
BY BETH PY-LIEBERMAN

BOTHER, NO PEN. DEEP AT THE BOTTOM OF my purse, I snag a purple crayon. Hey, I'm a mom, and I scrawl big waxy letters on the back of an envelope. Thank heaven for the ubiquitous crayon.

The object at hand is one of only a few known to exist. It is an original box of 64 Crayola crayons from 1958. It's the rare baby boomer who doesn't remember one like it—the first box with the built-in sharpener. It was given to the National Museum of American History (NMAH) last year at a celebration in Manhattan's Rainbow Room to honor the 40th anniversary of the package. Bob Keeshan—Captain Kangaroo—was there, and press accounts appeared for days. Reporters waxed nostalgic over the box with its classic green and yellow chevrons.

"Can a brand-new crayon color, Boomer Gray, be far behind?" asked a *New York Times* headline. We boomers: like everything else, we think we own the crayon. But the truth is, nearly everybody alive today probably made their first colorful squiggles with a Binney & Smith Crayola.

It was 1903 when the crayon made its debut. Before that a child's crayon was just a stick of colored clay or chalk. It looked nice but when put to paper, nothing much happened—not a pretty picture. Binney & Smith was a small, 21-year-old firm, owned by Edwin Binney and C. Harold Smith. They were already in the business of making color. They owned the rights to a line of red oxides of iron for the red paint used by most farmers on their barns. And they were also sellers of lamp black and white chalk.



At the Binney & Smith factory, crayon-filled sleeves will be packed into 48-, 64- or 96-crayon versions of the classic yellow-and-green Crayola boxes.

REGIS LEFEBURE

They had been among the first to solve the centuries-old problem of how to manufacture a really black black. The answer was expensive carbon black. Binney & Smith likes to credit itself for figuring out how to make it inexpensively. At the 1900 Paris Exposition, the company won a gold medal for its carbon black display.

In 1902, they cleared the dust from America's classrooms with the invention of the then-famous An-Du-Septic Dustless Blackboard Chalk. The new chalk won Binney & Smith another gold medal, at the 1904 St. Louis World's Fair.

By this time, they were doing a brisk business selling

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— *The Crocodile Hunter*

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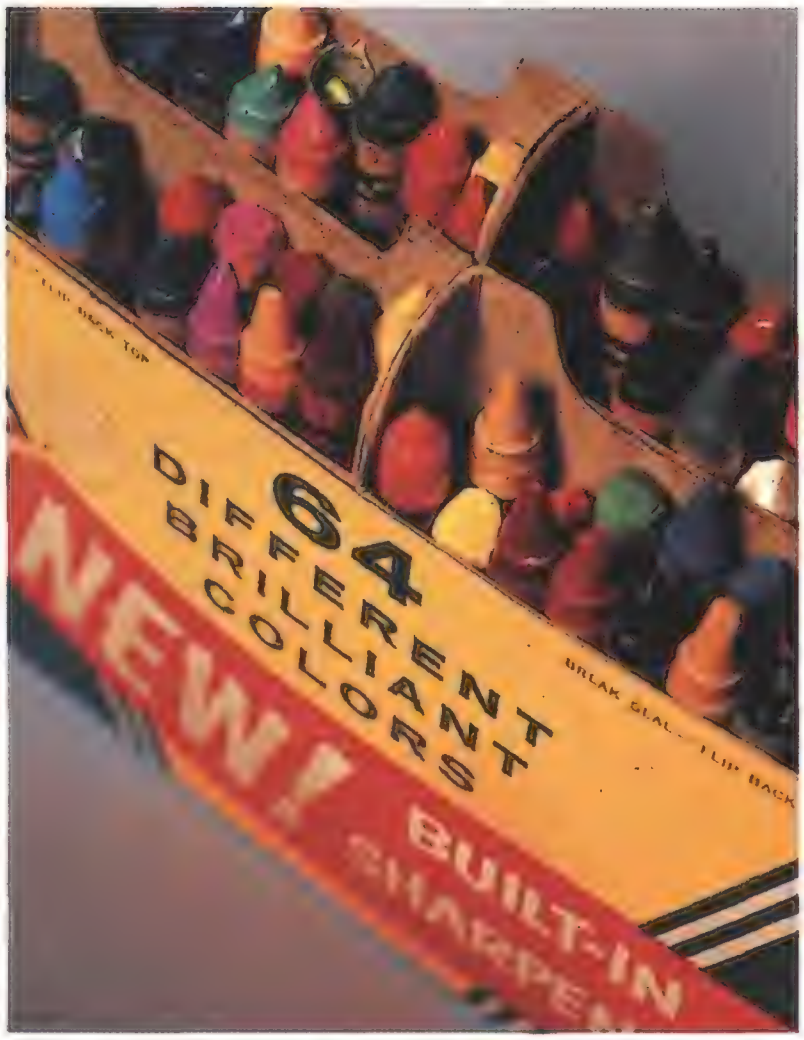
their products in America's classrooms. Besides chalk, they made slate pencils. But schools couldn't afford artist's crayons. The Easton, Pennsylvania, plant was already making an inexpensive industrial marking crayon out of carbon black and a durable paraffin.

Well, the rest is history. Color came to the classroom. It was Alice Binney, a former schoolteacher, who came up with the name Crayola. She combined the French word *craie,* meaning "chalk" with "ola," derived from "oleaginous," or "oily."

One of the first customers was the United States government, which began shipping crayons to schools on Indian reservations. Today the formulation of the nontoxic pigments and the wax, as well as how they give the crayons their distinctive smell, is a closely guarded secret. But some basics are clear.



Binney & Smith donated this 1958 Crayola box to the Smithsonian on the package's 40th anniversary.

Pigments, produced from natural sources—slate yields gray; metals, such as iron, yield reds; various types of earth yield yellows and browns—start off as powders that are pounded, ground, sieved, then refined and heated. The temperature determines the shade of color. Since 1903, more than 600 shades of Crayola crayons have been produced.

In June 1990 Binney & Smith decided to retire eight of its old colors to make some of the more modern, brighter colors that children seemed to be searching for in their artistic palettes. Not so fast, said a few of Crayola's veteran fans. One morning, a few weeks later, Binney & Smith executives arrived at their headquarters to find picketers protesting the decision. The RUMPs, or Raw Umber and Maise Preservation Society, and the CRAYONs, or Committee to Reestablish All Your Old Norms, had quickly mobilized their constituents. When the old colors were rereleased later that year in a special holiday commemorative collection, the groups were mollified. Not too long ago, "indian red" became the third Crayola color ever to be renamed, when Binney & Smith decided that even though the name referred to the pigment from India, sensitivity required a new name. The new name, "chestnut," selected by Crayola customers, seems rather dull when you compare it with the names that came in as close seconds—"baseball-mitt brown" and "the crayon formerly known as indian red." In 1958 "Prussian blue" was renamed "midnight blue," since most children had never heard of Prussia. And in 1962, "flesh" was renamed "peach."

Back at the National Museum of American History, a large storage-room drawer reveals the museum's extensive crayon collection, ranging from the very old to some of the more recent, even including fruit-scented versions. There's a box, dated 1912, with a picture of Peter Paul Rubens. "Unequaled for outdoor sketching," it says on the side, reflecting Impressionism's emerging popularity. Binney & Smith first marketed in two directions: to artists and to schoolchildren. Here's the schoolroom version: "Good in any climate, certified non-toxic." Here is a beautiful round wooden container that looks like a toothpick holder, full of crayons. And here is a beautifully crafted wooden box, its dovetail construction giving it the look of a treasure chest. The curator says that it *is* a treasure. It's filled with the 1941-57 factory standards—the master crayons, if you will. And there next to the standards is a box of today's "Multicultural My World Colors Crayons." The smell of paraffin bombards me. The olfactory system engages. The hypothalamus clicks on. Look out! Here they come—childhood memories!

That familiar smell—a Yale University study on scent recognition once ranked crayons as number 18 of the 20 most recognizable scents to American adults. When I visit Binney & Smith's seven-acre plant in Fork's Township, near Easton, that smell is making me feel like I'm 8 years old again. The plant is running full tilt to produce for the back-to-school season. Three billion crayons are made here each year. Wooden pallets, each piled with cases of crayons waiting to be packaged, line the walls. Outside the factory is a row of two-story storage tanks holding liquid paraffin, which will be pumped into vats and mixed with colored powdery pigment.

Crayon molder Michael Hunt, from Bangor, Pennsylvania, is showing me how it's been done since the very early days. Besides the paraffin and the pigment, Hunt tells me, the crayon also contains talc. "It's like the flour in a cake mix, gives it texture." His leather workman's boots are mottled with orange wax. Both of us are wearing protective goggles because the wax that he is pumping from his vat into a 40-pound pail is at 240 degrees Fahrenheit.

REGIS LEFEBURE

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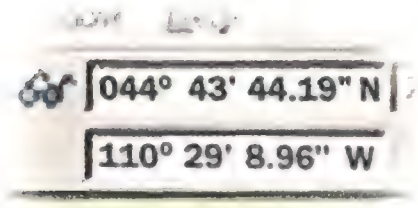

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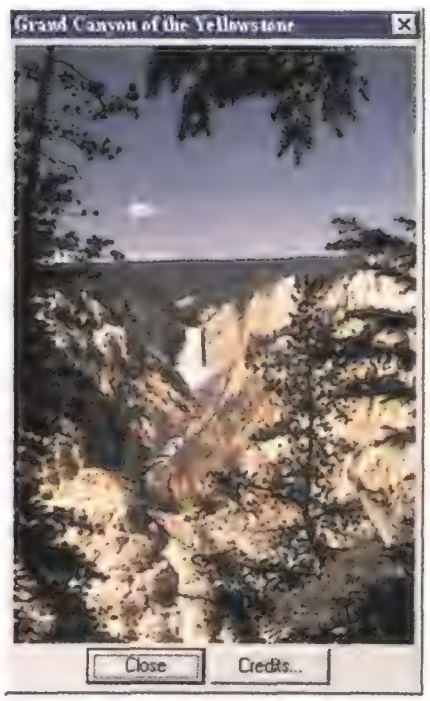

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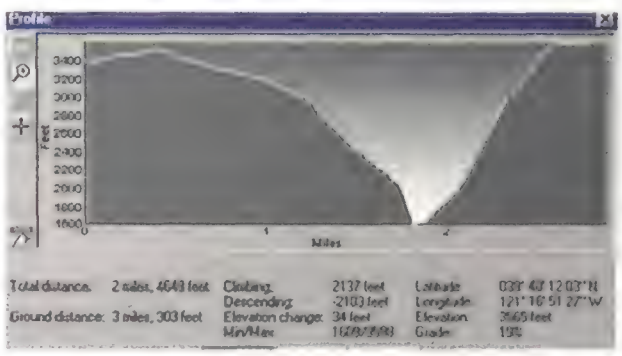

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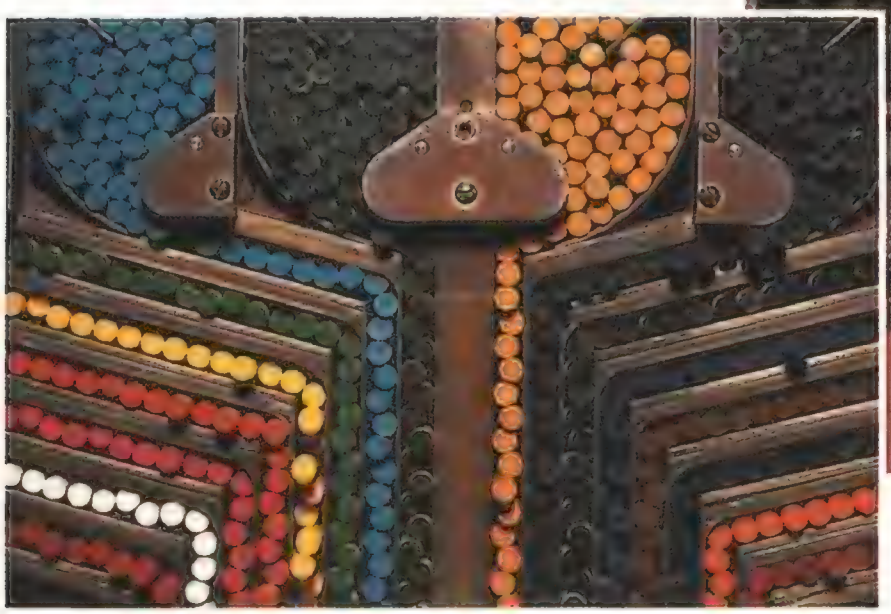


A Binney & Smith worker pours hot wax into molds to demonstrate how some crayons are made the old-fashioned way, by hand. A packing machine (below) will feed crayons into sleeves before they are boxed.

"Sometimes a little of it splashes onto my face," he tells me. "Stings a little, but it cools off pretty quickly." He deftly lifts the bucket out from under the vat and spills the wax out across the cooling table, a gentle wave rolling across the top as the wax settles into the molds—74 rows of eight. We're making the giant "My First Crayons" that fit easily into the hands of preschoolers.

We wait the 7½ minutes for the wax to cool. When a timer chimes, Hunt announces the crayons are ready. He runs a cutting device over the top of the molding table and shaves away the extra wax. Then he lays the collecting tray carefully over the top, lining up the holes. He touches a button, activating a press from below, and the crayons gently rise up into the collecting tray. With ease, Hunt hoists the 3½-foot-long tray of crayons around to the sorting table behind him and dumps the crayons there. On inspection, he pulls a couple of pointless runts from the rows and, with a wooden paddle, starts moving crayons from the table to a wrapping device. The whole old-fashioned process takes about 15 minutes.

Not too far away, a more modern, continuous-production operation is under way as a rotary molding table does all of Hunt's handwork mechanically. The machine is making the standard-size crayons. Materials go in one end, and operator Elizabeth Kimminour receives dozens of the thin, paper-wrapped products at the other end. She lays them neatly into cartons to be sent to the packaging plant.

And that's where I get a glimpse of the celebrated box of 64 being produced. Clicking and whirring, factory machines are endlessly fascinating for those of us who rarely see them in action. Grabbers mysteriously turn flat sheets of printed cardboard into boxes while plastic sharpeners, lined up like soldiers on parade, drop precisely onto a wheel that injects them into passing boxes, which somehow along the way end up with crayons in them.

Binney & Smith is owned today by Hallmark Cards. And that company closely guards the Crayola trademark. (Ms. Crayola Walker of Bellow Falls, Vermont, and Ms. Crayola Collins of Pulaski County, Virginia, however, were graciously allowed to "borrow" the name.) Many companies, particularly foreign ones, would like to capitalize on the Crayola fame, and copycatters try to steal all the time. In the NMAH collection, there's an example of one such attempt—a party bag made to look very Crayola, but it isn't. Licensing of the trademark is common, however, with products ranging from software videos, sheets and bedding, to backpacks, wallpaper and wall paints, and even shoes that look like a box of crayons.

Back home again with my kids and a neighbor's child, I announce that we are going to color. I pull three boxes of 64 from a bag and hand one to each child. In no time at all, their industrious minds—their entire bodies—are completely engrossed in their work.

I remember reading in the Binney & Smith literature a claim that as a youngster, Grant Wood, who later painted the iconic *American Gothic,* entered a Crayola coloring contest in the early 1900s and won. The sunlight pours in through the window, translating color to vision. Claire is making a rainbow. She picks up a crayon. "This is 'thistle.' It's what Eeyore eats." Next she chooses "dandelion," "forest green," "sky blue wisteria" and "tickle me pink." Patsy is drawing a portrait of Jessie, and Jessie is drawing the flower vase on the teacart. I try to imagine the inner workings of their creativity. Optical images register on the tiny retinas at the backs of their eyes, electronic signals travel the optic nerves to their brains, the signals are interpreted and messages sent back. Suddenly I snap out of my reverie as Jessie, pondering the red crayon in her hand, says, "I wonder who decided red should be 'red,' anyway?" And then she thinks a minute and says, "Do you think it was George Washington?"

REGIS LEFEBURE (2)

TERRY EVANS

Where the Prairie Grasses Grew

SPANNING A MILLION SQUARE MILES, THE North American prairie was once the world's largest grassland. Today, only remnants of the original ecosystem survive intact. Photographer and prairie native Terry Evans travels the historic grasslands studying the people who live there and the prairie's complex history. In the Flint Hills of Kansas is the hardscrabble community of Matfield Green, home to those who work the prairie ranches. There Evans met young Rosey Treadway (above), who had just found a bird nest that had fallen from a tree; a tiny hatchling was alive inside it. "She's very nurturing and she wanted to save it," says Evans. "In Place of Prairie," featuring 48 of Evans' photographs, goes on view November 30 at the National Museum of Natural History. —*Beth Py-Lieberman*

SMITHSONIAN HIGHLIGHTS

SMITHSONIAN HIGHLIGHTS

Painting Sunlight

NATIONAL MUSEUM OF AMERICAN ART

Edward Hopper is mostly remembered for his oil paintings—urban scenes thick with alienation and rigidly geometric in composition. But for the first time in 40 years the public will have the opportunity to view works from the period when the artist made pictures of a more carefree nature. Beginning in 1923, Hopper and his wife, artist Jo Nivison, journeyed from New York to the vacation towns along the New England coastline. They also visited Charleston, South Carolina, and Mexico. Working outdoors, Hopper drew lighthouses along the shore, gabled and dormered Victorian houses, fishing trawlers in their moorings and shifts of light and shadow along the beach. "I just wanted to paint sunlight on the side of a house," Hopper wrote. In Gloucester, Massachusetts, in 1923, he painted *The Mansard Roof* (below). Breezes billow the yellow awnings and rustle the grass, a scene that contrasts distinctly with what curator Virginia Mecklenburg calls "the psychic urgency" of his urban scenes. The summer watercolors brought Hopper his first critical and financial success. The Brooklyn Museum bought *The Mansard Roof* after including it in its 1923 watercolor show. The exhibition of Hopper's 56 watercolors will be on view through January 3. It next travels to Alabama's Montgomery Museum of Fine Arts, co-organizer of the show, from January 30 to March 26.

Hopper's *The Mansard Roof* will be on view at the National Museum of American Art.

Smithsonian Website

WWW.SMITHSONIANMAG.SI.EDU

Visit our homepage and click on "Events." The on-line calendar is designed so that visitors can click on and view on-line versions of these exhibitions, as well as the Websites of all the Smithsonian museums.

Exhibitions and Events

NATIONAL MUSEUM OF AFRICAN ART

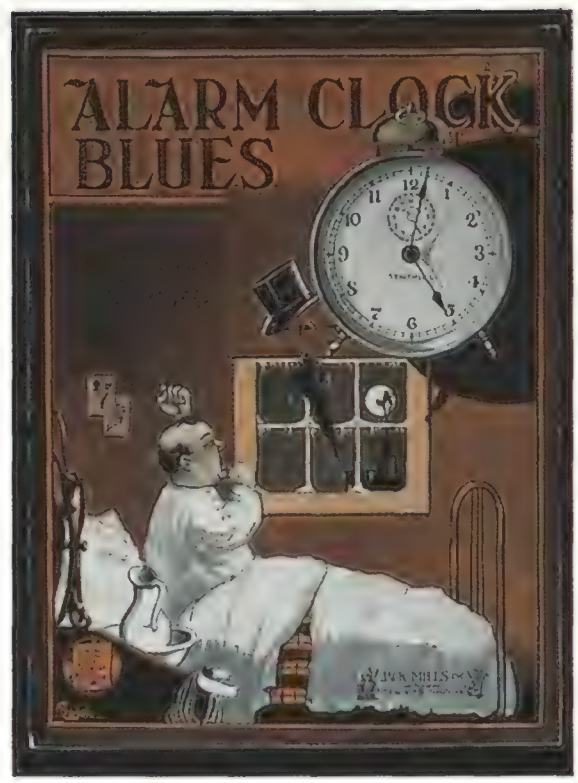
Wrapped in Pride: Ghanaian Kente and African American Identity (through January 2) Cosponsored by the Anacostia Museum and Center for African American History and Culture, the exhibition examines the history, weaving technology and uses of kente cloth. The exhibition continues in the Arts and Industries Building.

Hats Off! A Salute to African Headwear (through December 26) Drawing from its collection, the museum pays tribute to the creative genius of the makers of African headwear and the prestige of the wearers.

ARTS AND INDUSTRIES BUILDING

From Bento to Mixed Plate: Americans of Japanese Ancestry in Multicultural Hawaii (through November 30).

Revue Noire: Africa by Africans (through January 2) A celebration of a century of African photography, including studio portraiture, official press photography and works by contemporary image-makers.



Shake off those "sleep perturbin'. . . alarm clock blues" in "On Time" at NMAH.

RENWICK GALLERY (NMAA)

Glass! Glorious Glass! (January 30) The museum's studio glass collection reveals the range of techniques—casting, slump molding, blowing and lampworking—in this medium.

NATIONAL MUSEUM OF AMERICAN HISTORY

On Time (opens November 18) A permanent exhibition exploring the changing ways Americans have measured, used and thought about time during the past 300 years.

Make the Dirt Fly! Building the Panama Canal (November 20-January 5) A Smithsonian Institution Libraries exhibition on the heroic, ten-year engineering project.

Photographing History: Fred J. Maroon and the Nixon Years, 1970-1974 (through December 5) Many of these intimate and dramatic images by the Washington freelance photographer have never been exhibited before.

Preserving the Star-Spangled Banner: The Flag that Inspired the National Anthem Visitors are invited to observe the conservation process.

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NATIONAL MUSEUM OF NATURAL HISTORY

Ainu: Spirit of a Northern People (through January 2) A look at the 10,000-year-old culture of the Ainu, the indigenous people of northern Japan.

NATIONAL AIR AND SPACE MUSEUM

Breitling Orbiter 3 The gondola of the first balloon to travel nonstop around the world is on permanent display.

HIRSHHORN MUSEUM & SCULPTURE GARDEN

Regarding Beauty: A View of the Late Twentieth Century (through January 17) Explores the age-old concept of beauty and its contemporary interpretation.
Directions—Shahzia Sikander (November 18-February 21) Some 30 works on paper and a mural by the New York-based Pakistani artist.

NATIONAL POSTAL MUSEUM

Missing You: Last Letters from World War II (November 11-April 30) Tells the story of six servicemen and their last letters sent home before the writers were killed in action.
Posted Aboard R.M.S. Titanic (through June 12) Artifacts recovered at sea memorialize five sea post clerks who died when the great ship sank.

ARTHUR M. SACKLER GALLERY

Antoin Sevruguin and the Persian Image (November 21-May 28) Sevruguin's photographs are a pictorial record of the social history and culture of Iran.
Treasures from the Royal Tombs of Ur (through January 17) Presents a remarkable cache of artifacts, such as jewelry, musical instruments and tools, from the Sumerian city-state.
Construction Identities: Recent Works by Jananne al-Ani (November 21-February 28) Two pairs of large-format photographs and a related

Hercules Parting the Isthmus, 1914, is in "Make the Dirt Fly!" at NMAH.

SMITHSONIAN INSTITUTION LIBRARIES

SAMANTHA ELLIOTT, CATASTROPHE TEAM & KEVIN YATES, AGENT

slide projection by the contemporary artist challenge the "Oriental" female stereotype.
Imaging the Word: New Selections of Calligraphy from the Islamic World (November 17-May 7) Highlights the museum's collection from the ninth to the 20th century.

FREER GALLERY OF ART

A Breath of Spring (through January 9) On view is a 14th-century Chinese handscroll painting, recognized as one of the earliest and greatest examples of pure-ink painting.

ANACOSTIA MUSEUM

Through These Eyes: The Photography of P. H. Polk (through December 1) Works by Polk, the official photographer of Tuskegee University for nearly 50 years, spotlight Southern life in its many moods.

NATIONAL PORTRAIT GALLERY

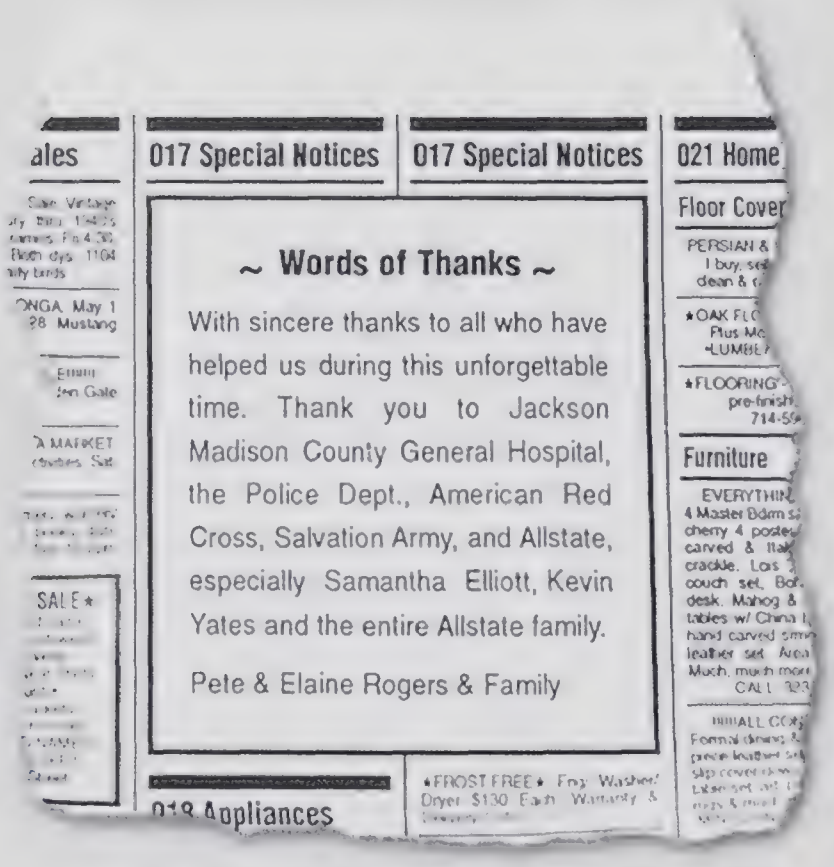
Tête à Tête: Portraits by Henri Cartier-Bresson (through January 9, 2000) Includes portraits of Truman Capote, William Faulkner and Alfred Stieglitz.
Picturing Hemingway: A Writer in His Time (through January 2).
A Durable Memento: Portraits of Augustus Washington, African American Daguerreotypist (through January 2).

Planning a Smithsonian Visit?

THE CASTLE—INFORMATION CENTER

Begin your visit at the Associates' Reception Desk in the Castle's Smithsonian Information Center—open 9 A.M.-4 P.M. daily. Special materials and information on exhibitions, activities and dining are available there. Learn what's new at the Smithsonian and about other area attractions—with brochures, videos, touch screens, electronic maps and more. Smithsonian museums are generally open 10 A.M.-5:30 P.M. daily, except December 25. To receive a free Associates' planning packet, write to Smithsonian Information, Smithsonian Institution, Washington, D.C. 20560-0010, or send your request via e-mail to info@info.si.edu, or call 202-357-2700 (voice) or 202-357-1729 (TTY), 9 A.M.-5 P.M., Monday-Friday; 10 A.M.-4 P.M., Saturday-Sunday. Note: Parking on the Mall is limited; Metrorail is convenient to most museums.

AT WORK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Under the Lemon Moon
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written and illustrated by Allen Say

Boy of the Deeps
written and illustrated by Ian Wallace

SMITHSONIAN'S Notable Books for Children, 1999

BY KATHLEEN BURKE

THE HEROINES (OR HEROES, FOR THAT matter) of Joan Aiken's novels for young adults are not to be trifled with. Observe, for instance, the opening sequence of *Is Underground* (1992), the moment when Is (short for Isbet) and her older sister Penny face down a pack of ravening wolves. In order to rescue a stranger, harried to their cottage by the bloodthirsty brutes, the two crack open the door and dispense justice unflinchingly: "A wolf catapulted inside, but was instantly driven out again by Is, twirling her burning faggot in its face. Then she knelt in the crack of the door, waving the improvised torch so as to give light while Penny stood guard over her with the gun, aimed high; next moment she fired, and, in the startled silence that followed the blast, gave her order: '*Quick*, Is—grab his arm, he's done in!'"

Having dispatched the wolves, the sisters

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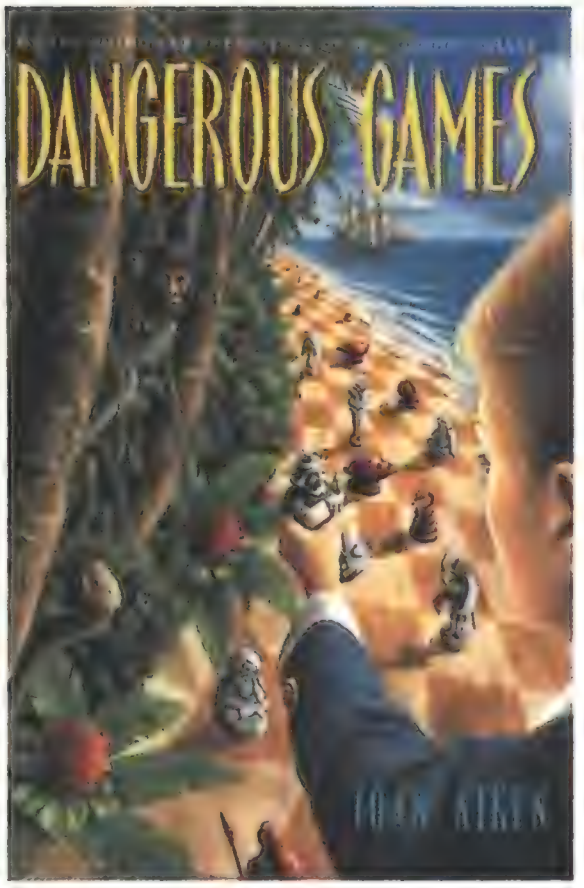
do pull the fellow inside to safety, a feat that sets in motion a remarkable odyssey for Is, a mission of daring and mercy into a forbidding North Country wasteland.

Aiken's interwoven series of historical novels, set in early 19th-century Britain, also opens with the harrowing specter of wolves, "grown savage and reckless from hunger," lurking at the edge of the heath. The first in the sequence, *The Wolves of Willoughby Chase*, acclaimed, when the book appeared in 1962, as "a masterpiece, a copybook lesson in those virtues a classic children's book must possess," was the initial offering in the cycle of stories that has come to be known, collectively, as the Wolves chronicles.

Each of the books, from *Willoughby Chase* on—*Black Hearts in Battersea*, *Nightbirds on Nantucket* (these two titles have been reissued this year by Houghton Mifflin, $15, hardbound; $5, paper), *The Cuckoo Tree*, *Dido and Pa*, *The Stolen Lake*, *Is Underground* and *Cold Shoulder Road*—takes place in a compelling time-out-of-time frame. Early 19th-century England is clearly the setting (with the exception of *Nightbirds*, which takes place on the island off the Massachusetts coast). But history is curiously obverted. The Stuart dynasty rules Britain, while the Hanoverian usurpers, plotting from exile, scheme to displace the rightful heirs. While this political intrigue underlies the action of the novels, it is the characters who command, and rightfully, our devotion.

Most of the Wolves titles entwine the parallel tales of two sharp-witted, kind and resourceful Cockney sisters, Dido Twite and her younger sibling, Is. (The eldest sister, Penny, emerges as a major figure in the masterful *Cold Shoulder Road* [1995].)

The most recent installment in Dido's adventures, *Dangerous Games*, published this year by Delacorte ($15.95), proves to be fully as ravishing as the earlier titles. Dido, in previous exploits, has proved her mettle



Dangerous Games by Joan Aiken

in matters great and small, whether concocting the remedy for a friend's devastating fever (huckleberries soaked in gin, she discovers, induce amazing recoveries) or foiling a Hanoverian plot to destroy St. Paul's Cathedral. Now fate casts her on the shores of Aratu, a mythical, and daunting, South Pacific island teeming with venomous vipers and rapacious villains. Dido's quest, this time, is overlaid with the practice of sorcery. As she ventures deeper into the interior, allying herself with the forest people, she discovers beneficent witchcraft in all its mystery and might.

It is a pleasure, also, to hear Dido's voice again, the distinctive Cockney intonations that reflect her creator's passion for dialect. Upon discovering, for instance, that she neglected to bring along the local snakebite remedy (a necessity on perilous Aratu) when she disembarked, Dido vents her exasperation with characteristic color: "Kandu nuts? Oh, scrape it. . . . When I left the ship I didn't expect to go gallivanting straightaway into the back o'beyond."

Aiken comes by these lyrical cadences naturally. The daughter of American poet Conrad Aiken and a Canadian mother, she was born into a bookish household in 1924, soon after her parents settled in Sussex. She knew an idyllic rural childhood there—Aiken didn't attend a school until she was 12—tramping the English countryside with her older brother, both of the children spinning tales as they rambled. The siblings spent evenings at their mother's side in the cottage, listening to Dickens and de la Mare, Kipling and Sir Walter Scott and Dumas.

All the romance, the poetry and the heart embedded in those classics shines from every page of Aiken as well. It is a rare enough achievement to create even one children's novel that is read with equal pleasure by youngsters and grown-ups alike. In the Wolves chronicles, readers can inhabit a world where, in a matchless series of titles, wit and poetry, drama and compassion, exist in equal measure. This most recent chapter in Dido's saga, *Dangerous Games*, is a gift to us all.

This year's children's titles demonstrate, as always, an astonishing imaginative and documentary range, transporting us from the mountains of Uganda to King Arthur's Cornwall, from an Eastern European shtetl to a village in Mexico and beyond.

As always, please note that age categories are quite arbitrary: consult the temperament and predilections of the individual child.

The following titles are available in the Museum Shop at the Smithsonian's Arts & Industries Building, or can be ordered by calling (202) 357-1368, from 10 A.M. to 5 P.M., seven days a week.

FOR THE YOUNGEST READERS [AGES 2-6]

Mr. Bear's New Baby written and illustrated by Debi Gliori (Orchard/Grolier, $15.95) Dedicated by the author to "families everywhere for whom an uninterrupted night's sleep is just a distant memory," this tongue-in-cheek recital recounts one night given over to cosseting a fretful newborn. Gliori's latest offering belongs on every nursery bookshelf, alongside her *Mr. Bear Babysits* and *Mr. Bear's Picnic*.

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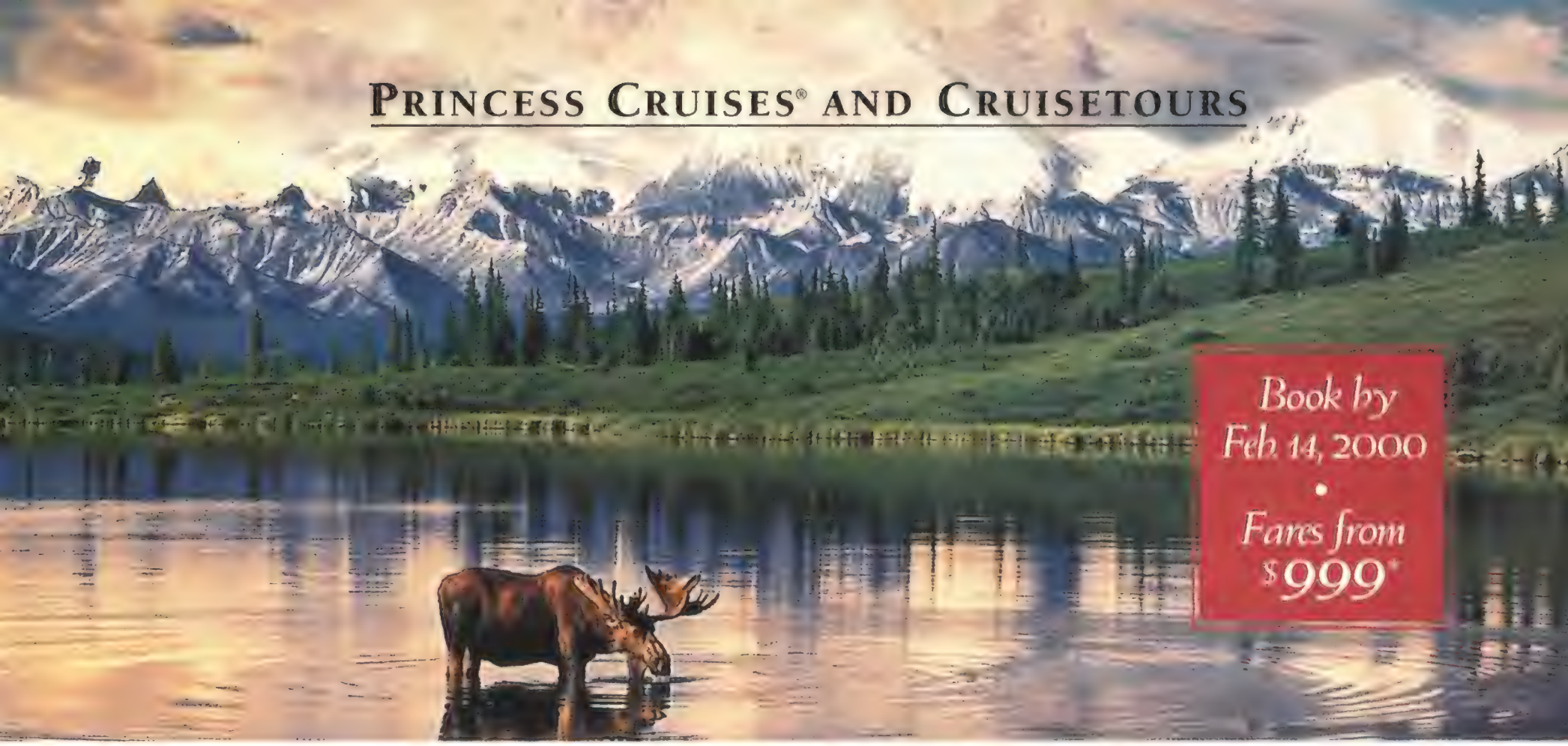

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My Favorite Word Book: Words and Pictures for the Very Young written and illustrated by Selina Young (Doubleday, $17.95) For the 6 and under crowd, Young's titles are works of whimsy and intelligence. In scenes ranging from home to school, supermarket to seashore, she conjures up an irresistible summons to the world of reading.

Hello, Lulu written and illustrated by Caroline Uff (Walker, $14.95) The rhythms of a toddler's day, accompanied by paintings glowing with primary-color radiance.

Your World: A First Encyclopedia by Angela Wilkes (Kingfisher, $24.95) Adroitly adapted for children beginning to read on their own, this handsome reference work invites browsing and attentive investigation.

Benny: An Adventure Story written and illustrated by Bob Graham (Candlewick, $16.99) A mutt turned traveling magician longs for the snug safety of hearth and home. Benny's saga is at once suspenseful and reassuring.

Billy and the Big New School by Catherine and Laurence Anholt (Albert Whitman, Morton Grove, Illinois, $14.95) From the British author-illustrators, a meditation on the challenge of leaving the nest, and the exhilaration of venturing into the wide world.

Gorilla Walk written and illustrated by Ted and Betsy Lewin

Celeste Sails to Spain written and illustrated by Alison Lester (Houghton Mifflin, $15) Whiling away a Saturday morning, larking about at a carnival: seven children invent variations on the theme of happiness. Lester's sunny and serene titles inhabit a class of their own.

Josh and *Josh and the Ducks* by Janet McLean, illustrated by Andrew McLean (Allen & Unwin, St. Leonards, New South Wales, Australia, $7.95) An introduction to the joys of canine companionship, featuring a wayward spaniel. The McLeans deserve a wide American audience.

Sammy and the Dinosaurs by Ian Whybrow, illustrated by Adrian Reynolds (Orchard/Grolier, $15.95) When a small boy dusts off some toy dinos and retrieves them from the attic, the magic begins. Kindness has its own compensations, as the creatures' gentle rescuer soon discovers.

When I Was Young: One family remembers 300 years of history by James Dunbar, illustrated by Martin Remphry (Carolrhoda/Lerner, Minneapolis, Minnesota, $15.95) Daily life, and abiding ties, bound up in memory: this clever chronology extols the sustaining power of oral tradition.

The Second Katie Morag Storybook written and illustrated by Mairi Hedderwick (Bodley Head/Trafalgar Square, North Pomfret, Vermont, $17.95) Another fetching installment in the Katie stories, set on the fictional Scottish island of Struay, where the plucky lass and her extended family live, a windswept world away.

Kindle Me a Riddle: A Pioneer Story by Roberta Karim, illustrated by Bethanne Andersen (Greenwillow/Morrow, $16) What was a wagon road, once on a time? (A buffalo trail, of course.) By tracing the origin of objects from woolen cloaks to candles, the elements of day-to-day life for a homesteading family are illumined with playful ingenuity.

How Whales Walked Into the Sea by Faith McNulty, illustrated by Ted Rand (Scholastic, $16.95) From the distinguished natural history writer, a cogent survey of the evolutionary developments that led to the existence of the awe-inspiring cetaceans—bowhead and orca, gray and humpback—sounding our seas today.

A Boy Named Giotto by Paolo Guarnieri, illustrated by Bimba Landmann, translated by Jonathan Galassi (Farrar Straus Giroux, $17) In 13th-century Italy, a shepherd boy, dreaming of painting the images he envisions, encounters the master Cimabue. This friendship frees the fledgling artist, who would one day produce the frescoes at Assisi and Padua.

Axle Annie by Robin Pulver, illustrated by Tedd Arnold (Dial/Penguin Putnam, $15.99) She's one unstoppable school-bus driver, even when it takes true grit to make it up snowstorm-swamped Tiger Hill. We hope to hear more from Annie.

What's in the Pond? and *What's under the Log?* written and illustrated by Anne Hunter (Houghton Mifflin,

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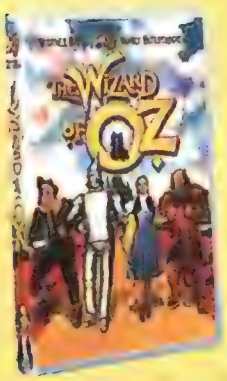

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$4.95 each) Hunter elevates the board book format to new heights: these first natural history primers contain marvelous wildlife watercolors.

FOR MIDDLE READERS [AGES 6-10]

Weslandia by Paul Fleischman, illustrated by Kevin Hawkes (Candlewick, $15.99) For intellectually pioneering children everywhere: a summer spent in the company of brainy and peaceable Wesley, who founds his own mini-civilization in the backyard, is also an excursion into the formation of culture.

Gorilla Walk written and illustrated by Ted and Betsy Lewin (Lothrop, Lee & Shepard/Morrow, $16) In 1997, the Lewins made the arduous trek into Uganda's Impenetrable Forest preserve, guided by the trackers who have dedicated themselves to the survival of the gravely endangered mountain gorilla. The couple's powerful account of that expedition is the sort of book that can change a child's life: within these pages, an aspiring young field biologist will find a life's work. This title enriches readers of any age.

Laugh-eteria written and illustrated by Douglas Florian (Harcourt Brace, $17) Zany, exuberant verse from the poet-artist whose creations will entice even a reluctant reader across the threshold to poetry.

The Peddler's Gift by Maxine Rose Schur, illustrated by Kimberly Bulcken Root (Dial/Penguin Putnam, $15.99) In rural 19th-century Russia, a boy steals a dreidel from a wandering tradesman, only to discover that a lesson in honor and altruism awaits him. This nuanced portrait of shtetl life opens a window on a lost world.

The Oxford Illustrated Book of American Children's Poems edited by Donald Hall (Oxford University Press, $19.95) Two centuries of verse, compiled by the eminent poet and children's author, constitute a magnificent anthology. This collection certainly must be regarded as an indis-

The Memory Coat by Elvira Woodruff, illustrated by Michael Dooling

pensable addition to the home library.

Ramona's World by Beverly Cleary (Morrow, $15) Hurrah! She's back, grown into a perky fourth-grader, looking forward to "the best year of her life, so far." This addition to Cleary's beloved Ramona novels, as comic as they are perceptive, was well worth the wait.

If You Hopped Like a Frog by David M. Schwartz, illustrated by James Warhola (Scholastic, $15.95) If you managed such a feat, "you could jump from home plate to first base in one mighty leap." Really fun math books are, regrettably, few and far between. Schwartz actually has created one. Ratio and proportion, pesky concepts both, will never be the same.

Blue Moon Soup: A Family Cookbook, recipes by Gary Goss, illustrated by Jane Dyer (Little, Brown, $16.95); ***Honest Pretzels*** written and illustrated by Mollie Katzen (Tricycle, Berkeley, California, $19.95) Chili to split pea, minestrone to matzo ball, Goss whips up a savory sampling of kid-friendly cuisine. Katzen's recipes include step-by-step directions, from the versatile vegetarian chef.

The Night Book by Pamela Hickman, illustrated by Suzanne Mogenson (Kids Can Press, Buffalo, New York, $12.95) Constructing starscopes, to understanding nocturnal animals, a lively guide for young naturalists.

A Band of Angels: A Story Inspired by the Jubilee Singers by Deborah Hopkinson, illustrated by Raul Colón (Atheneum, $16) In 1871, a group of students set out from the Fisk School, in Nashville, Tennessee, on a concert tour. These musicians carried the music of spirituals to the world.

While the Bear Sleeps: Winter Tales and Traditions retold by Caitlín Matthews, illustrated by Judith Christine Mills (Barefoot Books, New York, New York, $19.95) Solstice celebrations and Christmas, Hanukkah and Kwanzaa, festivals and lore, gathered in a treasury of stories sure to ward off chill and kindle cheer.

The Way Home written and illustrated by Nan Parson Rossiter (Dutton/Penguin Putnam, $15.99) A boy and his father nurse an injured Canada goose back to health. From that act of kinship with a wild creature, the benefactors reap unexpected recompense.

The Children's Atlas of World History by Neil DeMarco (Peter Bedrick, New York, New York, $19.95); ***The Kingfisher History Encyclopedia*** (Kingfisher, $39.95) Two outstanding reference works explicating antiquity to the present. DeMarco's overview is a marvel of compression. The comprehensive Kingfisher guide is a stellar compendium containing more than 2,000 color illustrations.

The Gate in the Wall by Ellen Howard (Atheneum/Simon & Schuster, $16) Fleeing her harsh existence as a mill worker, a girl stumbles upon a world that was, in Victorian England, largely hidden. As she enters into the life of the canal boat folk, ferrying goods throughout Britain, she finds a haven and a future. This accomplished novel re-creates vividly a subculture that thrived in Britain for 200 years.

Basket Moon by Mary Lyn Ray, illustrated by Barbara Cooney (Little, Brown, $15.95) Ray evokes the van-

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ished milieu of Hudson River Valley artisans who created sturdy pieces of folk art in the form of exquisite black-ash baskets. Caldecott-winner Cooney's paintings make this book a collector's item in itself.

Spectacular Science: A Book of Poems selected by Lee Bennett Hopkins, illustrated by Virginia Halstead (Simon & Schuster, $17) Ranging from magnets to metamorphosis, verse that transports us into the terrain shared by writers and scientists: the pursuit of creative insight.

The World of King Arthur and His Court by Kevin Crossley-Holland, illustrated by Peter Malone

Ancient Egyptians and their Neighbors: An Activity Guide by Marion Broida (Chicago Review Press, $16.95) Into the world of the ancient Near East: an interdisciplinary excursion that illuminates several complex cultures. Children will find precise instructions for constructing an Egyptian model garden, solving Mesopotamian math puzzles and cooking Nubian millet porridge. There's so much hands-on fun here you might turn off the TV for weeks and no one would notice.

The Babe & I by David A. Adler, illustrated by Terry Widener (Gulliver/Harcourt Brace, $16) In 1932, as the Great Depression engulfs everyone around him, an enterprising newsboy relies on the baseball star's exploits to sell papers—and save his family from ruin.

The Secret Life of Fairies by Penelope Larkspur, illustrated by Leslie Elizabeth Watts (Kids Can Press, Buffalo, New York, $14.95) This bewitching field guide to the little folk documents the details we've always wondered about: the foods fairies dine upon, the dwellings they inhabit, the raiment they weave.

Angel Spreads Her Wings by Judy Delton (Houghton Mifflin, $15) A goat tethered in the backyard? Lemon soup for lunch? Elm City, Wisconsin, seems light-years away as a 9-year-old homebody finds herself spending the summer in a Greek village.

Lootas, Little Wave Eater: An Orphaned Sea Otter's Story by Clare Hodgson Meeker, photographs by C. J. Casson (Sasquatch Books, Seattle, Washington, $12.95) A star attraction at the Seattle Aquarium is a 2-year-old otter, raised in captivity after the animal's mother was killed. The extraordinary commitment of the wildlife biologists and volunteers who nurtured Lootas takes center stage in this story.

Through My Eyes by Ruby Bridges (Scholastic, $16.95) In November 1960, when a 6-year-old girl, flanked by U.S. Marshalls, faced a segregationist mob as she entered the Frantz Public School in New Orleans, the nation watched. Bridges' memoir of that ordeal enriches our understanding of the individual sacrifice and courage that lay behind the civil rights movement.

Welcome Comfort written and illustrated by Patricia Polacco (Philomel/Penguin Putnam, $16.99) When a kindly school custodian and his wife take in a foster child with the unlikely moniker of Welcome Comfort, the couple orchestrate a holiday season where goodwill triumphs. Polacco has achieved the nearly impossible: a timeless Christmas tale, mercifully low in treacle content.

Tea with Milk written and illustrated by Allen Say (Houghton Mifflin, $17) The Caldecott Medal-winning author turns to the story of his mother, raised in San Francisco, who returned with her parents to Japan in the 1930s. Deeply homesick, she set off for Osaka and defied convention to pursue life as a working girl. Along the way, she met her husband-to-be, who also longed to forge a future that transcended and encompassed Japanese tradition.

Hercules by Robert Burleigh, illustrated by Raul Colón (Silver Whistle/Harcourt Brace, $16) Burleigh's poetic recasting of the hero's "last and most difficult labor: To snare the fierce and fiery Cerberus" transports young readers to Hades and back again.

Under the Lemon Moon by Edith Hope Fine, illustrated by René King Moreno (Lee & Low, $15.95) Seeking a remedy that will heal her languishing citrus tree, a young girl searches her Mexican village for answers. Generosity, she discovers, creates bonds among family, friends and strangers alike.

Boy of the Deeps written and illustrated by Ian Wallace (DK, $16.95) The author based this dramatic interlude on the experiences of his grandfather who, from childhood on, labored as a miner.

A Symphony of Whales by Steve Schuch, illustrated by Peter Sylvada (Harcourt Brace, $16) "In the winter of 1984-85," reports the writer, "nearly three thousand beluga whales were found trapped in the Senyavina Strait of Siberia." His fictionalized account of the rescue that ensued is riveting indeed. Sylvada's paintings shimmer with northern light.

Fair Ball! 14 Great Stars from Baseball's Negro Leagues written and illustrated by Jonah Winter (Scholastic, $15.95) Pop Lloyd, Oscar Charleston, Buck Leonard: legendary players

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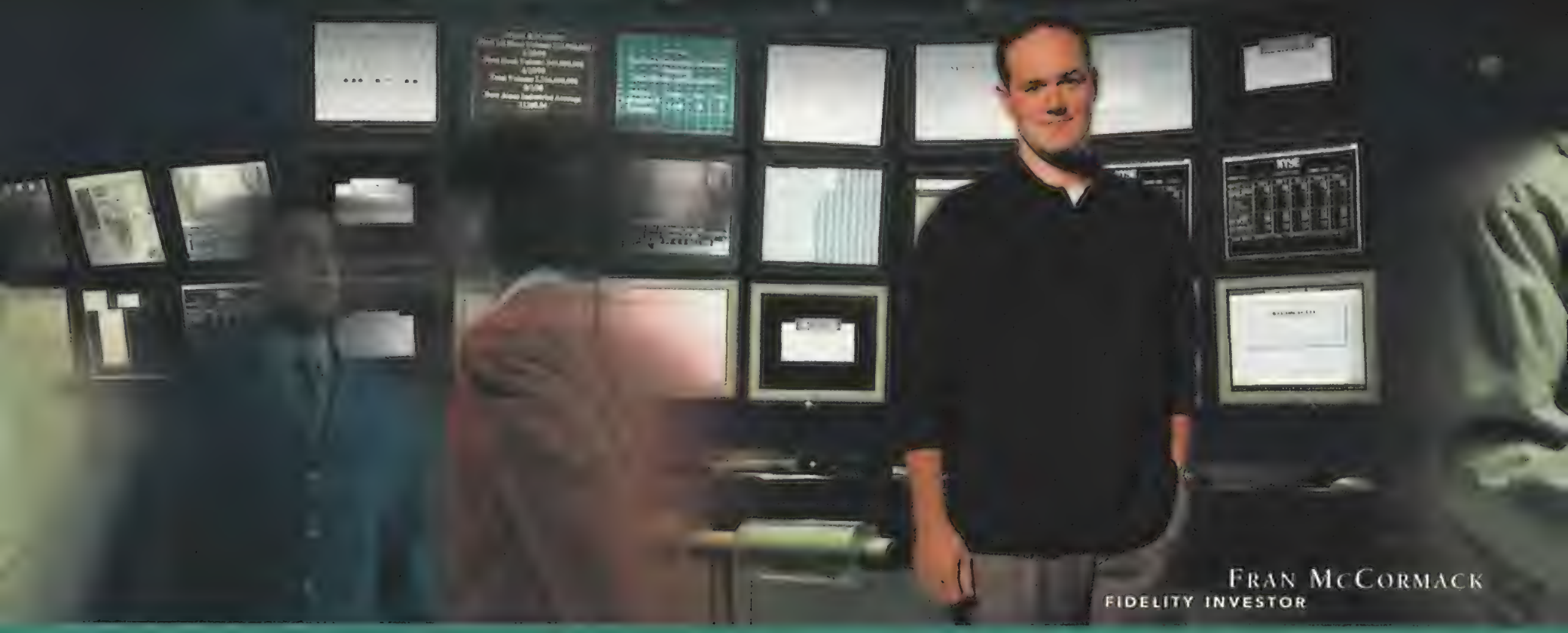

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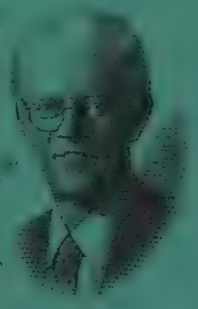

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from the decades when many of baseball's greatest talents were excluded from the majors.

Raising Sweetness by Diane Stanley, illustrated by G. Brian Karas (Putnam's, $15.99) Another tall tale from Texas, this sequel to the uproarious *Saving Sweetness* enlarges on the exploits of that take-charge orphan.

Tallchief: America's Prima Ballerina by Maria Tallchief with Rosemary Wells, illustrated by Gary Kelley (Viking/Penguin Putnam, $15.99) Maria Tallchief, the greatest American-born ballerina of her time, pursued a passion for dance from her earliest years, growing up in Oklahoma. Her journey to New York and fame is a tribute to genius.

The Memory Coat by Elvira Woodruff, illustrated by Michael Dooling (Scholastic, $15.95) During a visit to Ellis Island, the author spied an exhibit of clothing, including a frayed child's jacket. She summoned up the story behind the coat, imagining a boy who fled the czar's pogroms.

The Usborne Complete Book of the Microscope by Kirsteen Rogers (Usborne, London, England, $14.95) An entrancing overview of the hidden world—from insect eyes to viruses—elucidated by magnification.

The House of Wisdom by Florence Parry Heide and Judith Heide Gilliland, illustrated by Mary Grandpré (DK, $16.95) The beckoning city of ninth-century Baghdad, capital of a vast Islamic empire, was also the site of a remarkable library. The story of that gleaming edifice, the *bayt-al-hikmah*, or House of Wisdom, and its role as a repository of learning, is a little-known chapter in humanity's shared intellectual history.

Journeys with Elijah retold by Barbara Diamond Goldin, illustrated by Jerry Pinkney (Gulliver/Harcourt Brace, $20) Across time and distance, the protean figure of the ancient prophet appears, bearer of hope, friend to the dispossessed. Classic stories from Jewish folklore are amplified by paintings suffused with mystery.

Journeys with Elijah retold by Barbara Diamond Goldin, illustrated by Jerry Pinkney

In the Shade of the Níspero Tree by Carmen T. Bernier-Grand (Orchard/Grolier, $15.95) Set in Puerto Rico during the early 1960s, a rumination on the perils, poignant and amusing, of snobbery unleashed, and the meaning of friendship, introduces Tere and Ana, two fourth-grade soul mates. Tere loses her way and finds it again in a sensitive coming-of-age novel.

FOR OLDER READERS [AGES 10 AND UP]

Margaret Bourke-White: Her Pictures Were Her Life by Susan Goldman Rubin (Abrams, $19.95) A compelling biography of the pioneering photojournalist, the first female photographer for *Fortune* and *Life*, whose discerning eye created an extraordinary body of work.

Francie by Karen English (Farrar Straus Giroux, $16) The heroine, a bookish 12-year-old, yearns to head north. But before she can break away, Francie finds herself facing down the terror and intimidation that permeated life in Alabama during the 1940s. This testament to hope and friendship, set against the backdrop of the segregated South, is a deeply rewarding work for readers of any age.

The World of King Arthur and His Court by Kevin Crossley-Holland, illustrated by Peter Malone (Dutton/Penguin Putnam, $25) Excalibur to Lancelot, lore and legend, history and haunting excerpts from texts of the Middle Ages, vivifying the mythology of a deathless monarch.

All Alone in the Universe written and illustrated by Lynne Rae Perkins (Greenwillow/Morrow, $16) In the sleepy everytown of Seldem, 13-year-old Debbie navigates the shoals of early adolescence. As the year unfolds, she discovers that it is the small kindnesses, meted out by strangers and family members, that make the center hold. The novel's quirky charm and perfect-pitch take on teenagers signify an impressive debut.

Crazy Jack by Donna Jo Napoli (Delacorte, $15.95) Taking the boy-meets-beanstalk tale as a departure point, this sophisticated, poetic novel transforms the fairy story into a dreamy discourse on risk taking.

Kids On Strike! by Susan Campbell Bartoletti (Houghton Mifflin, $20) By the early 1900s in America, two million children were in the workforce. The author acknowledges the contributions of youngsters who fought for better conditions, from New England textile mills to Pennsylvania coal mines and New York sweatshops.

Harry Potter and the Prisoner of Azkaban by J. K. Rowling, illustrated by Mary Grandpré (Scholastic, $19.95) The wonder-boy wizard rides again. When Harry is not fending off the world's most dreadful relatives, he is back at Hogwarts School, preparing to confront an evil foe. This third title possesses all the high-spirited hilarity and enchantment of the previous books. The author plans several more titles, for which we thank our lucky tea leaves.

The Folk Keeper by Franny Billingsley (Atheneum/Simon & Schuster, $16) Only an enchanted few can hold at bay the dwellers of cellar and cave

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who visit mischief on humans. Corinna, herself a child of mystery, possesses that force. Billingsley has created a fantasy novel, rooted in Celtic and British folkloric tradition, yet grounded in fully drawn character.

Mr. Bear's New Baby written and illustrated by Debi Gliori

Sea Soup: Phytoplankton by Mary M. Cerullo, photographs by Bill Curtsinger (Tilbury House, Gardiner, Maine, $16.95) The microalgae that anchors the planet's food chain are the subject of this engaging voyage into the invisible life of our oceans. The title is accompanied by the equally impressive *Sea Soup Teacher's Guide* by Betsy T. Stevens ($9.95).

The Squire, His Knight & His Lady by Gerald Morris (Houghton Mifflin, $15) Drawing on medieval texts, principally *Sir Gawain and the Green Knight*, the author's deft adaptation of the Arthurian story cycle is briskly paced and eminently accessible.

Angels of Mercy: The Army Nurses of World War II by Betsy Kuhn (Atheneum/Simon & Schuster, $18) This admirable history, an homage to the 59,000 women who brought medical expertise and comfort to battlefields across the Pacific, North Africa and Europe, is based on interviews with scores of nurses.

One Good Apple: Growing Our Food for the Sake of the Earth written and photographed by Catharine Paladino (Houghton Mifflin, $15); ***Cool as a Cucumber, Hot as a Pepper: Fruit Vegetables*** by Meredith Sayles Hughes (Lerner, $25.26) Paladino conveys lucidly the hazards of reliance on wide-scale pesticide use. Hughes conducts a fascinating tour of realms botanical and horticultural.

Moonshine by Gary L. Blackwood (Marshall Cavendish, Tarrytown, New York, $14.95) Times are desperately hard in 1930s Missouri; 13-year-old Thad is trying to keep food on the table. One of the boy's sidelines is running corn liquor from backwoods stills to eager customers. As he moves deeper into the dangerous trade, he discovers that he may be selling himself, and his dreams, short. This sympathetic depiction of life in a Depression-era Ozarks village is another masterful offering from the author of *The Shakespeare Stealer*.

The Circuit: Stories from the Life of a Migrant Child by Francisco Jiménez (Houghton Mifflin, $15) During the 1940s and '50s, the author traveled throughout central California with his parents and siblings, harvesting crops. His account of his family's crushing poverty, and his own determination to pursue an education, is mesmerizing in its measured forcefulness.

Oy, Joy! by Lucy Frank (DK, $16.95) A ninth-grade Manhattanite heroine who stays up all night reading *Anna Karenina*, bakes great cakes and matchmakes shamelessly for her great uncle deserves to find her own true love. The author transcended the genre to create a high-school romance novel, so funny, brainy and sweet that one can only clamor for a sequel.

The Tiniest Giants: Discovering Dinosaur Eggs by Lowell Dingus and Luis Chiappe (Doubleday, $27.95) In 1997, paleontologists exploring in Patagonia discovered the first fossilized sauropod embryos. This chronicle of life on a field expedition unveils a world of 85 million years ago.

Backwater by Joan Bauer (G. P. Putnam's, $15.99) Sixteen-year-old Ivy Breedlove, aspiring historian, is bent on documenting her own family's past. That quest takes her deep into the Adirondacks, where she goes in search of an aunt who lives alone in the wilderness. Bauer has constructed a spirited foray into the satisfactions of self-reliance.

Shakespeare's Theatre by Andrew Langley, illustrated by June Everett (Oxford University Press, $17.95) The Bard's life and times, brilliantly brought to life in the tale of London's Globe, its past glory and remarkable reconstruction.

We Didn't Mean to Go to Sea written and illustrated by Arthur Ransome (David R. Godine, Lincoln, Massachusetts, $14.95) The New England publisher has rescued many a masterpiece from oblivion. This reissued title, the seventh in Ransome's peerless Swallows and Amazons adventure series, finds the four Walker children cast adrift and bound for Holland in the midst of a full gale.

Gypsy Rizka by Lloyd Alexander (Dutton/Penguin Putnam, $16.99) Puncturing pomposity and outwitting dolts, Rizka reigns supreme in the mythical village of Greater Dunitsa. Alexander's largehearted comedy celebrates a heroine, something of a Pippi Longstocking grown a bit older and wiser, who is always ten steps ahead of nearly everybody.

When I Was Your Age, Original Stories About Growing Up, Vol. II, edited by Amy Ehrlich (Candlewick, $16.99) Ten writers, including Howard Norman, E. L. Konigsburg and Joseph Bruchac, recall formative moments in their childhood—a ride in a runaway bookmobile, the birth of a new sibling, the return of a snapping turtle to the wild—with perception and grace.

Kathleen Burke will be reviewing children's titles on a regular basis for the new Website kidsbestbooks.com, coming on-line soon.

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WALKING A WILDLIFE HIGHWAY *from* YELLOWSTONE *to the* YUKON

BY DONOVAN WEBSTER

TREKKING FOR MORE THAN 2,000 MILES ACROSS RUGGED WILDERNESS, BIOLOGIST KARSTEN HEUER HAS BRAVED HAZARDS FROM BEARS TO AVALANCHES ON BEHALF OF A BOLD CONSERVATION INITIATIVE

PHOTOGRAPHS BY TED WOOD

NOBODY HAS TO TELL KARSTEN Heuer this is a little dangerous. A little foolhardy. But at this moment—a morning in late June—even if someone did try to advise Heuer against what he is about to undertake, Heuer in fact would have trouble hearing it.

That's because, just upriver of where he's lashing the last of his camping gear into the bottom of a yellow plastic canoe, the foaming thunder of Kinuseo Falls—taller than Niagara and pregnant with snowmelt this time of year—drowns out most any human sound.

In cloudy morning light, the cascade's falling water hurls a gale wind downstream, sending curtains of mist sailing. Beneath these veils, the Murray River is a chocolate-brown roil of whirlpools and exploding currents, punctuated by whole uprooted trees rushing past on the flood. Heuer, 30, a blond and sinewy Canadian National Park Ranger and contract biologist, points upstream toward the falls. "When we were last here," he shouts, "that thing was frozen. This whole place was under six feet of snow."

Heuer and his traveling partner, Leanne Allison, also 30, last came past British Columbia's Kinuseo Falls and its surrounding Monkman Provincial Park in mid-April, at the end of a backcountry ski trip made with a third friend, Jay Honeyman. By the time the three witnessed the frozen sculpture of Kinuseo Falls, they had skied nearly 250 deserted backcountry miles in 28 days, experiencing the snowy wilds of the Canadian Rockies the way few have since the Canadian trappers of old.

Reaching Kinuseo Falls in April ended the second of four legs on Heuer's Yellowstone-to-Yukon Hike, a two-year, 2,000-mile backcountry odyssey that's equal parts low-key promotional tour and ground survey. As Heuer moves slowly north under his own power, he stops in towns to meet with a support van, change into clean clothes, and give slide presentations about his hike and the Yellowstone-to-Yukon

Seeking to follow the movements of large carnivores, including wolves, whose tracks mark the trail at left, Heuer has hiked the enormous range required by these animals. He and companion Leanne Allison (overleaf, paddling at the base of British Columbia's Kinuseo Falls) covered part of the distance by canoe.

Conservation Initiative: a joint Canadian/U.S. proposal to conserve or reweave connections between habitat areas along the northern half of the Rocky Mountains.

From the greater Yellowstone ecosystem in the south to the Yukon's Mackenzie Mountains up north—an area encompassing roughly 460,000 square miles—Heuer is also walking to make note of highways, fences, clear-cuts, railroads and uncontrolled urban developments that present obstacles to the free flow of animals, especially large carnivores, which require enormous habitat ranges to hunt and reproduce successfully. As reported by the World Wildlife Fund Canada, for instance, scientists estimate that to protect a population of 500 grizzly bears in the Rockies from the effects of disease, inbreeding and habitat destruction, almost 50,000 square miles is required. Unfortunately, that's an area 15 times the size of Yellowstone.

Setting out from Mammoth Hot Springs, in Wyoming, Heuer traveled along the spine of the Northern Rockies within the Y2Y study area, a distance of about 2,000 miles.

"Our belief," Heuer says, "is that if we can conserve the migratory corridors these large carnivores use to travel from conserved area to conserved area inside the system, the small animals will be conserved as well—since the large animals require so much more habitat to survive."

For the moment, however, near the base of Kinuseo Falls, the only animal migration Heuer can afford to worry about is his own. He and Allison have lugged their canoe and equipment more than a mile over a low mountain to get here, and both are raring to go. They work efficiently, but their usually quick smiles and genial humor are now supplanted by tight-mouthed silence. While both Heuer and Allison are expert white-water boaters, a streak of unseasonably hot weather has released a huge amount of high-country snow as meltwater—and the river is dangerously full. Add to this that regular parade of uprooted trees (which may jam together beneath bridges or across rock bars downstream to create unavoidable obstacles) and the tension seems justifiable.

Heuer steps into his place at the canoe's stern, kneeling to keep the boat's center of gravity low. In seconds, he is as focused as an arrow in mid-flight.

"Come on, Web," he says to his dog, a 6-year-old Border collie named Webster, who has made most of the trip alongside his master. Heuer pats the pile of waterproof bags in the center of the canoe. "Time to go, boy. Come on."

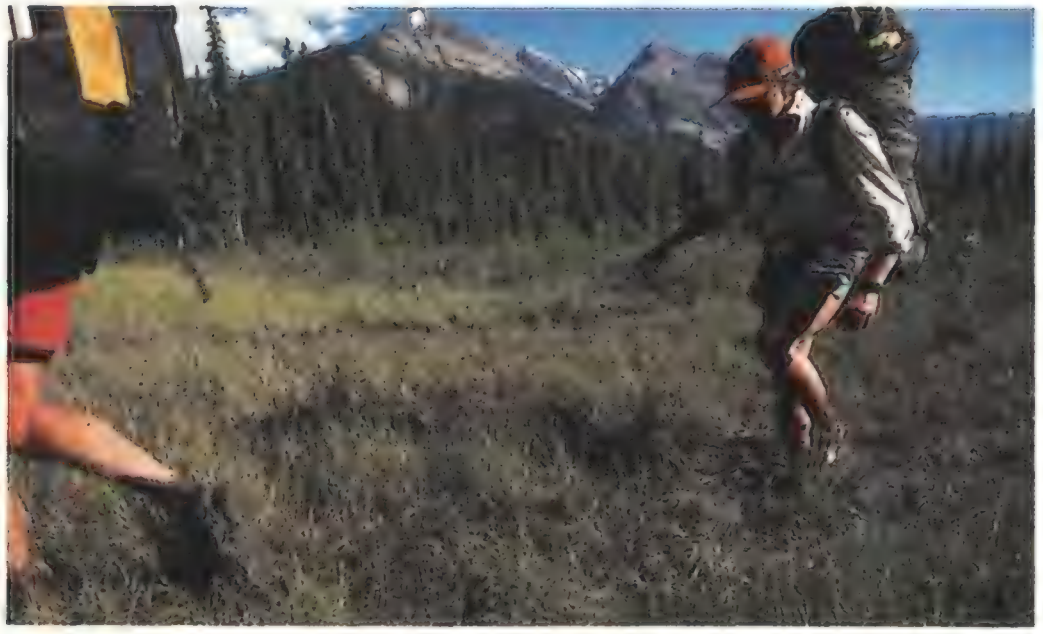
The sleek black-and-white pooch stares quizzically at Heuer for a moment, then does as he's told, stepping off the beach and unsteadily onto the bags. As the dog curls up, Allison slips into the canoe's bow and kneels as well. Together, she and Heuer lift their paddles and back-ferry off the rocky beach.

A tree drifts past. Three more logs spin along the beach's eddy. "OK, let's go," Heuer says as the river flows momentarily free of snags. With a few smooth paddle strokes—solidly mechanical as an outboard motor—the yellow canoe slices through the eddy line and seamlessly enters the current, setting out on a journey toward some of North America's largest remaining wilderness.

The idea for a Yellowstone-to-Yukon (Y2Y) Conservation Initiative has its roots in the early 1990s, when a now-40-year-old Calgary man named Harvey Locke—a former environmental lawyer turned full-time conservationist—was trying cases intended to stanch human development in bear, wolf and elk habitats.

Locke, a fifth-generation descendant of European

MAP: MIKE REAGAN



Traversing the trackless backcountry requires a readiness to take on every terrain. Along the Tuchodi River in British Columbia, Heuer and Allison wade waist-deep through willow shrubs and slog across muddy swampland.

settlers in Alberta (mountain passes and valleys across the Canadian Rockies are named for his family), came up with some surprising data in preparing for his cases. "I was reading a book called *Wild Hunters: Predators in Peril* by Monte Hummel and Sherry Pettigrew," Locke says. The study suggested that large carnivores require more range than had been assumed previously.

Locke also found other evidence that these animals need more area to survive than originally thought. A study by two biologists—Paul Paquet, a Canadian, and Diane Boyd, an American—followed three radio-collared wolves for two years, discovering that they ranged as far as 60,000 square miles each. One wolf roamed from the Flathead Valley in Montana all the way north to the Alaska Highway—more than 600 linear miles.

Finally, Locke had been studying the Wildlands Project, a 1991 proposal to set aside large areas of the North American continent as a network of wilderness reserves, surrounded by buffers and connected by wildlife corridors. "I'd been thinking about all this," Locke continues, "and one night in 1993—on a backcountry trip to the Redfern-Keily Park of British Columbia—it came together in my mind. I was sitting by the campfire. The place was so beautiful, I began outlining a discussion paper for a North-

In the hamlet of Hudson's Hope, British Columbia, Heuer explains the Y2Y mission. He delivered presentations on the conservation initiative to audiences along his route.

ern Rockies preserve right on the edge of my topographic map. The words 'Yellowstone-to-Yukon' actually appeared on my map's edge that night by the fire. It seemed to crystallize what a lot of people had been thinking about."

Before long, the Y2Y Conservation Initiative spawned positive input from a chorus of noted biologists, including Paquet and Boyd, and the Craighead Environmental Research Institute, the Sonoran Institute and members of the Society for Conservation Biology. A map, delineating the study zone for future conservation planning, was drawn up. That area stretches 1,600 miles north to south along the spine of the Northern Rockies. Inside the Y2Y territory, the goal is to create a protected matrix of core habitat—including 11 national parks and dozens of existing national wilderness areas and provincial parks—connected by a network of wildlife corridors. Surrounding these preserves and their arteries would be buffer zones: larger "multiple-use areas" where managed human endeavors like mining and logging can carry on at varying levels. Hunting and sportfishing would continue in the region.

"You've got to incorporate human activity into this from the outset," Locke says. "After all, a million people live inside the proposed Y2Y range, and some take their living from the land. You can't alienate the people living here and expect to succeed. If, for instance, the ranchers don't agree, then key private land connections will be lost."

For Karsten Heuer, joining the Y2Y crowd "just made sense." As a backcountry ranger and biologist, Heuer had already spent years investigating the movements of large carnivores in Banff and beyond when, in 1994, he first learned of Y2Y. "Soon as I heard it," he says, "I thought, 'Well, there's a good idea.' I'd been doing research on cougars and wolves—reading the literature as well as doing fieldwork—and the scale of the problem had already jumped out at me."

Further reinforcing Y2Y's goals in Heuer's mind was a 1996 work exchange he had done on a wildlife reserve in South Africa. As a visiting biologist, he'd worked with a veterinarian to restore several types of large carnivore—lions, cheetahs and African wild dogs—to that country's Madikwe Game Reserve. "We were trying to return these populations to the southern Kalahari Desert, near the Botswana border," he says. "We were manipulating migrations, upsetting biodiversity systems that had already crumbled to the point—in some cases—of near extinction. And it was very expensive."

The cost of the African wild-dog reintroduction especially rang with Heuer. At about $30,000 apiece, six wild dogs were introduced to Madikwe in 1995. After their release, during the period that Heuer was in South Africa, the dogs thrived; before long, the pack numbered 24 animals. Then, with head-spinning speed, a bite from a rabid jackal felled the pack's alpha male. Within a month, the virus had killed 21 pack members.

"Somewhere during this time," Heuer says, "I realized the value of what we still have here in the Northern Rockies, and that we need to conserve it. I got to wondering, is the level of migration that Y2Y is suggesting even possible? So I decided to travel the proposed Y2Y zone as an animal would, as a symbolic grizzly bear or wolf."

Fortunately, in 1,400 miles of overland travel so far, Heuer is proud of pointing out, he's crossed 92 mountain passes and run into 11 grizzlies but has encountered only eight major highways. "So as a conservation initiative, Y2Y still has a strong chance to succeed," he adds. "There are possible solutions. We can dig wildlife underpasses beneath what few roads or rail lines currently block the corridor, or we can erect wildlife overpasses above them. We can still make this work."

Yet, for all the cautious planning and hopeful talk, the Y2Y proposal has found its share of critics, some of whom are eager to share their opinions with Heuer. When he stopped to give a slide show in the ranching town of Augusta, Montana, for instance, "there was one guy in particular," Heuer says, chuckling. "He was a rancher named Ray Krone . . . Man, he grilled me."

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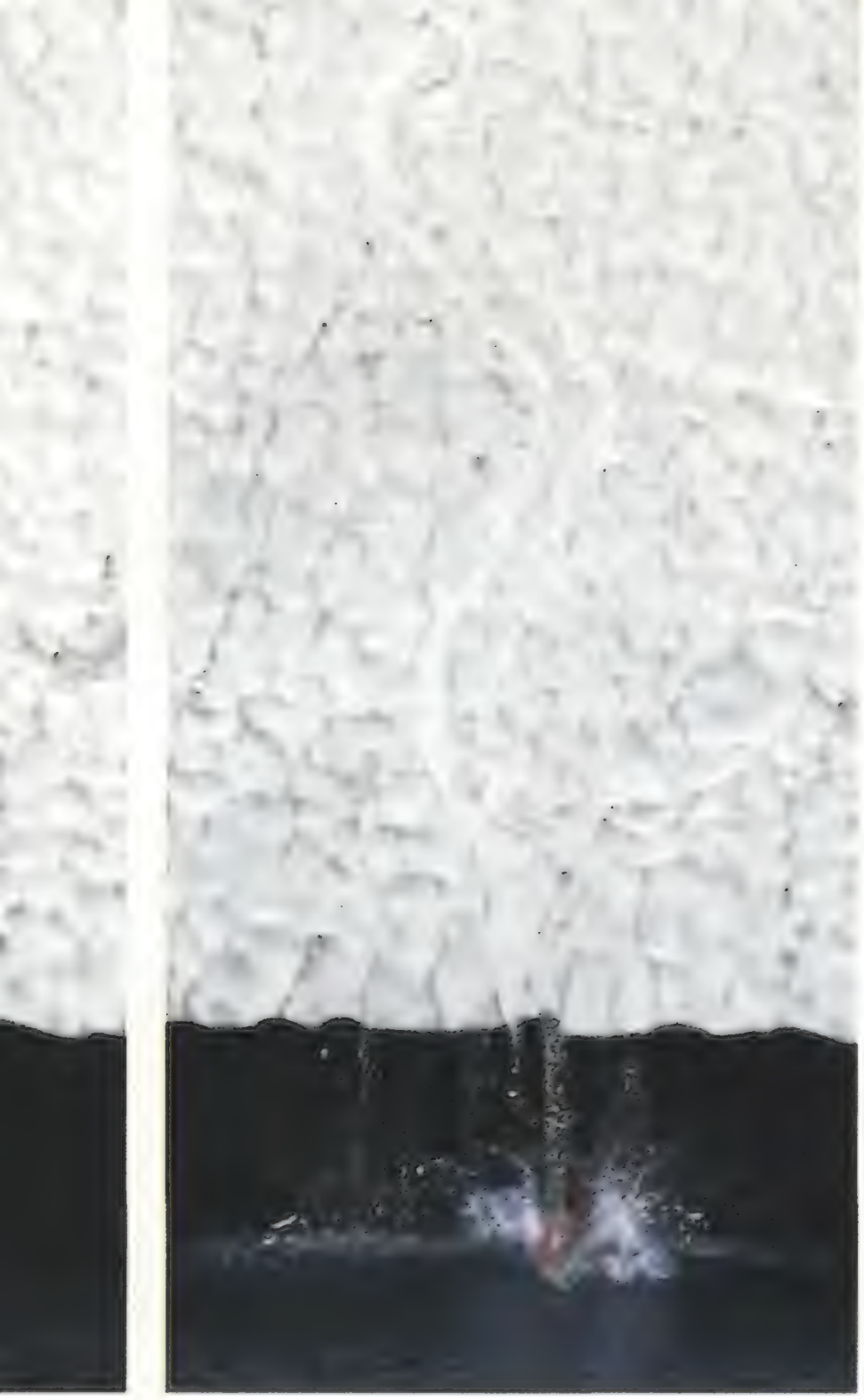
Careening down the face of a snowbank, near the headwaters of the Gataga River, an exuberant Heuer, playful as a river otter, plunges into the frigid waters of Campobasso Lake.

Krone, 75, is paterfamilias of a 60,000-acre Montana cattle ranch that's been in his family for generations. And while Krone has "nothing personal against Karsten Heuer," he isn't reluctant to air an opposing opinion, either. "Anything that takes management of land away from a rancher or private citizen," Krone says, "I'm generally against. Usually because it costs me and other ranchers like me a lot of money. Like the wolf reintroduction—why would a rancher want that?"

Krone tells of a neighbor who allowed the U.S. Fish and Wildlife Service to place a reintroductory wolf den on his property. "Before long," Krone says, "there were 23 wolves in that pack. They moved onto my place and killed a calf a day . . . an occurrence which was extremely hard to prove since the wolves eat everything—even the skin and bones. Ultimately, an agency offered to reimburse me for two calves that year. How can I run a successful ranch when I lose a calf a day to a government wildlife policy?"

Heuer, for his part, doesn't expect to change everyone's mind. Instead, like a circuit rider from a century ago, he's simply traveling to these outlands as a voice for the Y2Y proposal. "All I can do," he says, "is give another perspective. Ultimately Y2Y will have to be agreed to by everyone, or it won't be enacted. I'm just trying to get the word out."

And Krone is not worrying alone. Upon Y2Y's announcement, the news magazine *British Columbia Report* published a splashily contrarian cover story, advancing the notion that humans in the Y2Y zone were the animals needing most urgent protection. Then came the Forest Alliance of British Columbia, which published its own review on the Y2Y implementation, noting it may cost British Columbia 80,000 jobs. Another organization, Canada's North Central Municipal Association—a body made up of elected officials across north-central British Colum-



bia—passed a resolution last spring opposing Y2Y, stating publicly they will not support what they view as Y2Y's stricter land-use policies.

At the same time, Y2Y is being embraced in some quarters. More than 200 U.S. and Canadian individuals and environmental and conservation groups have signed on as affiliates, and localized Y2Y management districts across the proposed zone—to better address each area's needs and political landscapes—have started to coalesce.

In some places, Y2Y principles already have been implemented. Recently, using a Y2Y-style, multiuse roundtable approach to define everyone's needs, the government of British Columbia has protected more than 2.5 million acres of public wilderness. The protected land, in the northern part of the province, is also encircled by another 8 million acres of special management area. Fortunately, these lands lie within the proposed Y2Y study area.

No one may be more aware of the divisive realities confronting Y2Y's success than Karsten Heuer. After all, in scores of stops along his route, he's been taking the public's temperature about the plan for more than a year.

Tonight, Heuer will make his speech in the pretty little town of Hudson's Hope, British Columbia. Set between gorgeous lines of forested ridges and headed by a massive hydroelectric complex that supplies power to much of two Canadian provinces, Hudson's Hope is a perfect petri dish in which to view the conflicting opinions on Y2Y.

In the parking lot outside the town's community center—sided in robin's-egg blue—much of the town seems to be turning out to hear Heuer speak. Shortly after the doors open, the center's white interior is filled with every stripe of Hudson's Hoper. Neat middle-class families have arrived to sit in the front row, their young children jazzed to see Heuer's pictures of wolves and bears and sweeping mountain vistas. Velcro-sneakered retirees file in, too. As do Guy and Mary Armitage, the local beekeepers. And coming in last, there's a seemingly solid phalanx of sturdy men just off their shifts on timber skidders and earthmovers. They're still in dusty T-shirts, jeans and heavy steel-toed boots; on their belts, they wear GPS receivers and cellular telephones and big knives.

Then the lights dim and the show begins. While Heuer downplays his ability as a public speaker, he is remarkably effective at translating Y2Y's underpinnings and goals—not to mention the glorious breadth of his adventure—in accessible and nonthreatening language. Using straightforward slides, some complete with figures and mission statements, he defines what Y2Y is and the reasons for creating the conservation zones. Interspersed with these, he tells stories paired to slides of knee-bucklingly dramatic Rocky Mountain landscapes.

Since June 6, 1998, when Heuer began his Y2Y Hike from the shores of Mammoth Hot Springs in Yellowstone National Park—carrying a backpack of donated food and on a two-year leave of absence from his work at Banff National Park—he and his hiking companions have seemingly always had a camera ready. They have captured a North American wilderness that can't be seen from the pavement.

On the first leg of his trip, from Yellowstone to Jasper, Alberta, sticking to lands inside the proposed Y2Y range, Heuer pieced together a path on which he spent 61 of 114 days in protected wildlife areas. Often hiking ridgetops blown free of late-season snow, just as an animal wanting to avoid human contact would, Heuer and Maxine Achurch—a friend who helped organize the hike—merged onto what seemed to be wildlife highways. "We saw hundreds of individual tracks," Heuer says, showing a photo-

Taking temporary shelter along the trail, Heuer catches up on some laundry from the porch of an isolated outfitter's cabin.

graph of a muddy mountaintop trail through massive snowfields. "Wolves, elk, bears, wolverines, everything Y2Y is proposing to conserve moved along this same trail." In fact, on all but 19 of those first 114 days, Heuer says, evidence of grizzly bears was found.

When Achurch departed after six weeks, Heuer and Webster traveled alone. Then, one midnight, having not seen a person for days, they camped in a "wind tunnel of sculpted rock at the bottom of a valley in Montana's Big Belt Mountains." A horrendous storm blew up, knocking Heuer's tent flat and destroying his campsite. In the deafening noise, Heuer couldn't tell if boulders were tumbling down the valley walls, threatening his camp. He spent the remainder of the night out of the tent, wrapped in a tarp and freezing. Under the tarp, Webster cowered between Heuer's legs as hail and icy rain slammed them in a blistering wind. "I was shivering uncontrollably; I thought I might die of exposure that night," he says. "But I got through it by saying, over and over again: 'This is only temporary, this is only temporary.' And the next morning, the day dawned beautiful."

After northward traveling visits by his father (a Calgary-based city planner), mother (a real estate agent) and sister, Erica (the Y2Y Hike's publicist), Heuer and Webster again spent several weeks alone in the wilderness. One evening, in Canada's Waterton Lakes National Park—just across the U.S./Canadian border from Montana's Glacier National Park—Heuer searched for hours for a rare campsite without sign of grizzly bears. Everywhere he looked he saw bear scat, and boulders tipped over and logs torn apart—the work of bears searching for grubs and insects—and fur in tree bark where bears had been rubbing up against the trunks. Finally, after Heuer felt he'd found an area safe from bears, he heard a helicopter land in the distance as night fell. The next day he found out what happened. "A man had been killed by a grizzly less than a mile away from where I was camped," Heuer says. "And while that was a tragedy, I also thought: that's the wilderness. We're not the top of the food chain out there . . . and that adds an edge to the experience that I kind of respect."

Heuer's trail map proves a fascinating slide in itself. His trip's first stretch—1,200 miles from Yellowstone to Jasper, Alberta—was completed between June and October of 1998. His second leg was the March to April backcountry ski from Jasper to Kinuseo Falls, which spanned almost 250 miles. The third, beginning with the canoe trip on the Murray River, will turn into a 400-mile hike along the Continental Divide to the headwaters of the Gataga River in northern British Columbia. (The fourth and final leg, another combined canoe trip and hike along the Gataga/Kechika river system, was completed in early September at Watson Lake, Yukon—more than 2,000 twisty mountain miles from where he started. When he reached Watson Lake, Heuer had hiked past the headwaters of ten major river systems, seen most of the region's 70 different mammal species, walked along rivers teeming with 118 different types of fish and crossed the nesting areas of more than 275 species of bird.)

By the time the 40-minute show has ended, the people of Hudson's Hope have been led by Heuer on a trip of their own. They have learned how difficult it is to cache a string of ten-day provisions before each leg begins: in steel canisters and high in trees, to frustrate bears and wolverines. They have heard that Heuer has only a few dollars in his bank account; that he and Leanne Allison and Jay Honeyman struggled to advance just two miles a day on the trip's ski section; that during the Y2Y Hike's ski leg, Heuer released an entire mountain snowfield in an avalanche—fortunately, without lethal consequences.

Near the end of his show, Heuer flashes a slide that seems to focus all of what Y2Y means. It's a broad green valley, ringed by jagged and glaciated peaks. Heuer points to a tiny cliff ledge near the front of the photograph. "This

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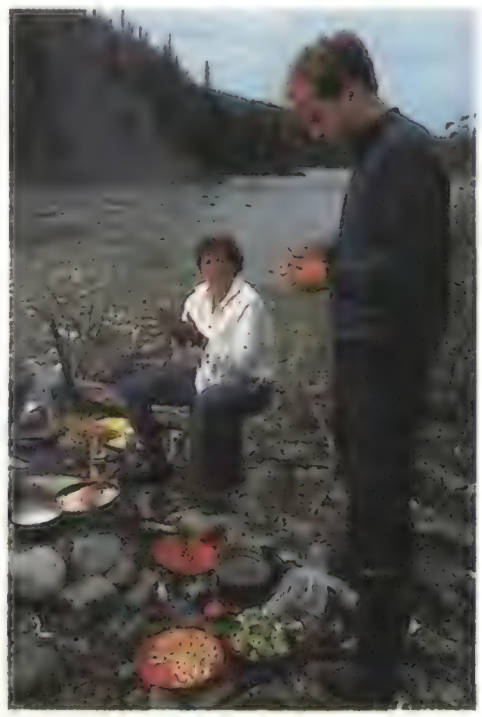
Daily routines included pitching a nylon two-man tent and preparing meals, freeze-dried or, occasionally, fresh over a campfire.

is in the backcountry of Waterton Lakes National Park, in Alberta," Heuer says. "I remember sitting on this knife-edge ridge, watching a wolf leaping around and mousing across the grass in the valley below. It was so wild, so beautiful. I remember thinking: this is what I'm trying to conserve. Tears welled up in my eyes."

Then the lights come up; Heuer opens the floor to questions. Some of them are curious and polite: Does he carry a gun? "No, it's too heavy." Has Webster traveled the entire distance? "No, not on the ski leg, because the snow was too deep. Though, if you could ask him, old Web would probably say he could have made it."

Two men, on different sides of the aisle, pipe up. Both want to know what this proposal will mean to hunters. One of them, Ian Stacey, wants to make sure Y2Y won't compromise sportsmen. "As long as hunting is done sustainably," Heuer says, "I see no conflict with the Y2Y vision."



The other gentleman, Wayne McIver, is concerned about a few of the 200 sponsors already signed on with Y2Y. Some are antihunting. How does Y2Y jibe with that? "These groups have joined our mission," Heuer says. "We have not joined theirs. They have an agenda, but it isn't our agenda. They have merely signed on in support of Y2Y—which doesn't mean we support the programs they're pushing for individually."

Ian Stacey is determined not to have Y2Y's stance on hunting "talked around." He asks again about potential restrictions. The take-home message, Heuer responds, is that Y2Y is not antihunting; decisions must be made concerning what levels of hunting are acceptable to everyone. "We recognize that everyone—hunters, loggers, miners, recreational users—has an interest in maintaining the wilderness for the future," Heuer says. "The challenge will be in doing this to everyone's satisfaction. I think it can be done."

Then, with an almost audible break,

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Larking about in their canoe, Allison demonstrates her flawless headstand as Heuer, paddling gingerly, steadies the craft.

the meeting is over. People mill over the Y2Y T-shirts and calendars Erica Heuer is selling at the back of the room. And hunters Stacey and McIver walk out into the last rays of the day's sun. Both agree that, while they went in skeptical, they've emerged at least still open-minded.

As Bill Lindsay, town administrator of Hudson's Hope, locks up the community center for the night, he also appears to be cautiously agreeable. "I think most people worry about the Y2Y proposal affecting their jobs and ways of life, which is only realistic," he says. "Karsten and his program helped calm them a little, I think. It's a good show, but there's still a lot of convincing to do."

Back on the Murray River, Karsten Heuer and Leanne Allison are having a little fun—blowing off steam now that the tumble of Kinuseo Falls is safely behind them. In the fast-moving water, they are carried downstream at perhaps ten miles an hour, the water's surface gradually growing calmer as the river passes between snowcapped peaks. To Allison, this smoothing of the still-brown river's surface means it's time for fun. "Keep us steady," she says over her shoulder to Heuer, "I'm going to do a headstand."

Leaning forward, hands clutching the gunwales of the canoe, arms pressuring the boat's interior as it skims along, Allison slowly goes bottoms up. First her head drops to the canoe's floor. Then, slowly, her nylon-panted legs and sandaled feet rise skyward until, for a full minute or so, she stands inverted in the canoe—legs wavering in the air—before lowering herself back to more balanced safety.

Webster seems relieved when Allison has returned to a more tenable position inside the boat. An accomplished yoga practitioner, Allison is a consummate outdoorsperson in her own right. In 1993, she was a member of the first all-female team to summit Mount Logan, Canada's highest peak, via the east ridge route, and she has done glaciology research only 300 miles from the South Pole. As a friend of Heuer's since the two were 5-year-olds, she signed on for the remainder of the trip. Back in her seat, her knit cap dripping from the inch of icy, standing river water on the canoe's floor, she's grinning.

Heuer is smiling, too. Foot by foot, problem by problem, recalcitrant rancher by recalcitrant rancher, he is doing all he can to turn the Y2Y Conservation Initiative into a reality. With friends along and his dog at his side—and with the future of some of North America's most remote wilderness hanging in the balance—Karsten Heuer dips his paddle into the Murray River once again, and steers gently forward.

Donovan Webster was a little uneasy at the prospect of encountering a grizzly. Ted Wood is based in Jackson Hole, Wyoming.

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Age	10 YEAR	15 YEAR	20 YEAR	25 YEAR	30 YEAR
35	$ 103	$ 125	$ 145	$ 183	$ 205
40	$ 123	$ 158	$ 185	$ 238	$ 260
45	$ 190	$ 215	$ 253	$ 330	$ 385
50	$ 253	$ 290	$ 363	$ 490	$ 495
55	$ 360	$ 413	$ 550	$ 835	$ 1,015
60	$ 503	$ 608	$ 845	$ 2,135	$ 2,400
65	$ 775	$ 975	$1,593	$ 3,900	$ 3,900
70	$1,338	$ 1,600	$2,970	$ 7,220	$ 7,220
75	$2,275	$ 4,870	$5,820	$10,440	$12,420

Male Premiums

Age	10 YEAR	15 YEAR	20 YEAR	25 YEAR	30 YEAR
35	$ 123	$ 138	$ 165	$ 223	$ 253
40	$ 148	$ 183	$ 225	$ 288	$ 335
45	$ 225	$ 300	$ 360	$ 450	$ 513
50	$ 338	$ 455	$ 525	$ 730	$ 828
55	$ 500	$ 670	$ 768	$ 1,638	$ 2,330
60	$ 783	$ 990	$1,265	$ 3,630	$ 3,630
65	$1,330	$ 1,650	$2,693	$ 5,250	$ 5,250
70	$2,448	$ 3,175	$4,860	$ 8,790	$ 8,790
75	$4,400	$ 7,443	$9,600	$13,260	$15,030

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JUST TWO YEARS AFTER A DEVASTATING EARTHQUAKE, THE BASILICA OF ST. FRANCIS IN ASSISI REOPENS ITS DOORS

An Act of FAITH & the Restorer's ART

BY
RICHARD
COVINGTON

PHOTOGRAPHS BY
ROMANO
CAGNONI

Restorer Sergio Fusetti "bandages" a 13th-century fresco of Christ and the angels by Roman master Jacopo Torriti on a damaged vault of the Upper Church. Fusetti is applying an overlay of rice paper and acrylic resin to bind the paint to the plaster.

SERGIO FUSETTI WAS STANDING AT THE ALTAR WHEN HE HEARD A SOUND LIKE DISTANT thunder rumble through his precious church, the Basilica of St. Francis in Assisi. Instinctively, he looked up. He saw cracks appearing in the figure of Saint Matthew 65 feet above him. Out of the corner of an eye, Fusetti spied more cracks fissuring along the frescoed walls and ceiling of the church he had been restoring steadily for the past 26 years. Everything was undulating crazily. He shuddered as the entire basilica heaved up. Only then did he make a dash for the door. He was just a few strides from the altar when the heavens—or rather, the 13th-century fresco of a starry sky and the brick vault it was painted on—crashed around him. Weeks later, he would still bear bruises shaped like bricks on his shoulders and chest.

On top of the collapsed fresco and vault, a hard rain of rubble—broken roof tiles, wood beams and stones—enveloped him. Clawing away with one arm, Fusetti managed to extricate himself and stumble out a door into the dazzling September sunshine.

"When I got out, I thought at first that the whole church had collapsed," the restorer recalls as he polishes off a glass of red wine. Before the earthquake, the 47-year-old Fusetti never drank and rarely smoked. These days, he's a born-again fatalist, giving in to a little wine at meals and as many cigarettes as he likes.

We are seated in a restaurant overlooking the very-much-intact pink-and-white basilica, crowning glory of this walled medieval hill town in Umbria 118 miles southeast of Florence. An artistic and religious pilgrimage site comparable in importance to St. Peter's in Rome, Assisi draws millions of visitors who flock here to marvel at the unparalleled ensemble of seminal frescoes and pay homage at the crypt containing the bones of the town's most famous son.

Liberally endowed by the papacy since its creation and still under the control of the Vatican, the basilica is actually two churches built together, one on top of the other, with the entrance to the Romanesque Lower Church tucked beneath a buttress to the south side of the largely Gothic Upper Church. For months following the earthquake, much of the Upper Church was sheathed in scaffolding; now only a portion of the southern side is trussed up.

"I was lucky that the earthquake was short—12 seconds," Fusetti continues. "Another 7 seconds and I wouldn't be here talking to you."

Others were not so lucky. Four people—two structural experts and two friars—were killed in the earthquake that struck the basilica at 11:42 A.M. on September 26, 1997. Like Fusetti, they were inspecting the damage from an earlier tremor when the main earthquake, measuring nearly 6.0 on the Richter scale, slammed into the 750-year-old basilica. They were buried beneath two tons of frescoes, brick vaulting, supporting ribs, plaster and rubble, which fell with such force that it smashed portions of the stone floor.

By the time the dust had settled, some 2,300 square feet of frescoes, including transcendent works attributed to the Florentine artists Giotto and Cimabue, had collapsed, shattering into tens of thousands of fragments. According to *Time* magazine art critic Robert Hughes, it was the "worst catastrophe to afflict the fragile patrimony of Italian art history since the 1966 flood in Florence." The basilica—filled literally top to bottom with masterpieces and unquestionably one of the pivotal artistic, architectural and spiritual achievements of mankind—suffered grave but not, as it turned out, irreparable damage.

"Irreparable" is not a word Fusetti,

ABRAMS & SESTINI PHOTOS, FROM THE BASILICA OF ST. FRANCES OF ASSISI: GLORY AND DESTRUCTION

Opposite: Frames from a videotape shot during the September 1997 earthquake that shook the Basilica of St. Francis in Assisi capture the dramatic collapse of a section of vault and its priceless 13th-century frescoes inside the entrance to the Upper Church. Above: The restoration of the basilica nears completion. The facade of the Upper Church is at right.

who oversees the basilica's overall structural and artistic restoration, and Paola Passalacqua, the restorer coordinating the effort to piece together the Giotto and Cimabue frescoes, recognize. This month, after a painstaking restoration undertaken by a team of architects, engineers, art historians, conservators and church officials, along with a small battalion of 100 paid workers and 500 volunteers, the Upper Church of the basilica, closed since the earthquake, is scheduled to reopen. Pope John Paul II has been invited to address the ceremonies. Accomplished in record time by Italian standards, the reconstruction has been a race to beat the deadline of Jubilee year 2000, when Assisi expects the arrival of 12 million visitors—triple the normal number.

"The paintings will look even more brilliant than before," promises Fusetti. He should know; he and his team of private restorers completed a full-scale restoration of the Upper Church only 14 years ago.

In the 1997 quake, the entire ceiling of the Upper Church was riven with cracks, some wide enough to put a fist through. Four sections collapsed completely, leaving two gaping holes. The opening near the entrance spanned 1,000 square feet and contained two sections attributed to Giotto and his assistants—a large fresco of Saint Jerome and smaller frescoes of other saints. Above the altar, two sections containing a large fresco of Saint Matthew by Cimabue and parts of a starry sky covered nearly 1,300 square feet. Apart from the bricks with frescoes still intact, the largest fragments from these collapsed sections fit in the palm of a hand, while the smallest are no bigger than a bread crumb.

If not all the frescoes are in place by January 2000 (and Passalacqua estimates it will take at least another two years before some of them are ready), it will not be for lack of trying. In addition to the immensely patient team of restorers manually piecing fragments together, Passalacqua is placing her faith in an experimental computer program designed by researchers at Rome's La Sapienza University to help reassemble the shattered frescoes. She anticipates that at least two of the eight collapsed saints attributed to Giotto and his assistants will be back in place on the archivolt, a decorated arch inside the entrance, by Christmas.

If there is a single monument that encapsulates the origins of Italian art, it is the Basilica of St. Francis in Assisi. According to the Italian art historian Elvio Lunghi, a local authority who has written extensively about the church and its art, the basilica marks the transition from the static, medieval style of painting to the more

realistic, animated manner that ultimately flowered into the Renaissance.

Though Cimabue's roots lay deep in the Byzantine tradition, with its otherworldly images frozen in a spiritual realm of eternal symbols, he imbued those stylized forms with emotive content and a heightened sense of drama. His student Giotto brought art further down to earth. The frescoes of the life of Saint Francis attributed to Giotto unfold like a period drama, with recognizable characters playing out highly charged scenes against a backdrop of familiar landmarks. What Giotto did to revolutionize art, Saint Francis did to scourge the hidebound medieval Church.

With its low, rounded ceilings, the somber Lower Church contains the work of both these Florentine masters as well as radiant frescoes by the later 14th-century Sienese painters Simone Martini and Pietro Lorenzetti. Here, too, are some of the basilica's earliest frescoes, innovative works by the artist known as the St. Francis Master. The Lower Church emerged relatively unscathed from the 1997 earthquake, and frescoes that had been shaken loose from the masonry have now been reattached.

The Upper Church, with its pale stone facade opening onto a broad green lawn, has stained-glass windows illuminating a soaring, light-filled interior, its walls and ceiling awash in the cinematic "greatest hits" of early Italian art. The most famous of these are the 28-fresco cycle of the life of Saint Francis and a pair of supernally haunting *Crucifixions* by Cimabue, rendered ghostly by the oxidation of lead white paint. Faces, bodies and clothing have been transformed into a shadowy dark brown like a photographic negative.

Dante, discoursing on the fleeting nature of temporal glory, evoked these rival artists in *The Divine Comedy* in 1310: "In painting Cimabue thought he held / the field, and now it's Giotto they acclaim— / the former only keeps a shadowed fame."

Following the quake, volunteers and students sift through the rubble from the collapsed vault above the main altar, searching for fragments with smooth, painted surfaces—pieces in the vast jigsaw puzzle of shattered frescoes. Right: Salvaged fragments from the Cimabue vault, filling 1,023 plastic crates, were temporarily stored beneath the Sacred Convent.

"The basilica is the jewel of all Italian churches in terms of art," says Alan Feltus, an American figurative painter living in the countryside near Assisi. It was the incomparable beauty of the basilica's art that convinced Feltus, his artist wife, Lani Irwin, and their two sons to move here from Washington, D.C. a dozen years ago.

During lunch under a vine-covered arbor, Feltus and his 20-year-old son, Tobias, describe what it was like to be among the hundreds of volunteers who streamed into Assisi to help save, sift and sort fragments from the collapsed frescoes. Even though it was tedious, heart-wrenching work, father and son spent a month at it, crouching over piles of rubble in an improvised staging area on the lawn in front of the Upper Church.

"It didn't matter how much could be retrieved or where the fragments would end up," Alan recalls. "If we could salvage any part, it was worth doing. It was a very emotional time because we were constantly being

reminded of the loss of life and the loss of art as we held up little pieces of fresco that meant so much to us, trying to save every crumb."

The basilica, of course, is not simply a museum. It is first and foremost a sacred memorial to the mild-tempered founder of the Franciscan order, a visionary miracle worker who became the much-revered patron saint of Italy. The frescoes are inseparable from the itinerant mystic who preached to the birds and called the sun his brother and the moon his sister—the man who espoused obedience, chastity and poverty and wanted to be left unburied, "laid out naked on the naked earth."

"If we could salvage any part, it was worth doing. It was a very emotional time."

Sergio Fusetti tugs his beard and flashes an amiably diabolical grin as if he has a sixth sense about people like me who have a fear of heights. As we slide up the side of the left transept, high above the cubist jumble of red tile roofs, the Umbrian plain emerges hundreds of feet below, an elongated patchwork of green fields planted in grain, olive groves and sunflowers.

A bearish character with the build of a heavyweight boxer and fierce brown eyes, Fusetti is hardly the picture I imagined of the art restorer as scholarly aesthete. A former sculpture student, he is a self-taught restorer who has worked on reviving fading artistic treasures all over Italy.

The elevator deposits us in front of the tympanum, the once-crumbling triangular apex of the transept that nearly crashed through the roof. In a daring rescue operation, two cranes hoisted a 4.7-ton metal truss 120 feet into the air and gently sheathed it over the tympanum, just minutes before a powerful aftershock rocked the basilica. Now that truss is gone and the disintegrating stones have been replaced with freshly hewn ones, striated in pink and white to look as timeworn and weather-beaten as the originals.

On a recent visit to Assisi, I was given a preview of the reconstructed basilica, from the subbasement stables to the vertiginous rooftops, still under construction. Clanging shut the metal door of the outdoor elevator cage,

Up on the roof, workmen are installing steel plates, attaching them to rods fixed to the vaults below for greater stability. Fusetti ducks into a low opening at the rear of the church. I follow him onto a metal catwalk that runs below the roof and above the ceiling vaults the entire length of the 228-foot nave. From the dizzying vista outside, I enter the cramped attic

space with a rush of claustrophobia. Illuminated by electric lamps and sunlight filtering in from the round window above the larger rose window at the church entrance, more workmen are laminating thin strips of wood and composite fiber to serve as reinforcing ribs for the vaults.

"The most serious structural damage was suffered right here in the vaults," Fusetti explains. "Until the scaffolding was built in the church—and that took six months—there was the risk that the remaining vaults could have collapsed at any time."

The indefatigable Paola Passalacqua labors over the world's most daunting jigsaw puzzle.

Before work could be done on the vaults, however, the restorers had to dangle from the catwalk to remove 1,300 tons of discarded rubble piled up from roofing operations over the centuries. Every ounce of this crushing weight had to be lifted out by hand and gently poured down an exterior chute snaking down the facade of the church. Originally it was thought that the weight of the rubble acted to shore up the vaults. But as the earthquake so catastrophically demonstrated, it only placed more, not less, strain on the arched ceiling. According to Fusetti, the vaults that fell gave way because they were situated at the two least flexible sections of the church—the entrance and the crossing of the nave and transept.

I ask about the concrete roof supports, installed in the 1950s, that some critics blamed for worsening the earthquake damage. Fusetti dismisses the criticism with a brusque wave of the hand. "If anything, the concrete supports helped the roof withstand damage," he replies with finality.

The two yawning holes in the ceiling have now been filled in with 35,000 handmade bricks. Kevlar strips crisscross the fissured vaults like giant Band-Aids. In an extremely delicate, time-consuming operation, restorers used syringes to inject more than a mile of cracks with a specially formulated mortar designed not to seep through to the frescoed surfaces.

Gesturing to the series of massive steel collars recently bolted around the church's stone piers just above the ceiling, Fusetti explains how the collars shift the weight of the roof onto the walls of the church and away from the vaults. Next comes a steel belt girding the entire Upper Church at about 25 feet above ground level, a precaution intended to make the structure virtually earthquake-proof. Nothing would make Fusetti happier. "Before the ceiling fell on me, I always thought the basilica would be the safest spot in the region during an earthquake," he remarks dryly. "Now it really will be."

I follow the restorer down stone stairs inside a tower adjoining the apse and emerge into a gleaming forest of scaffolding. Virtually the entire Upper Church is filled from the floor to within seven feet of the ceiling with 18.6 miles of galvanized steel-tube scaffolding, specially engineered, says Fusetti, to help support the vaults—a lucky thing, since aftershocks continued up until June 1998. Over the din of clanging and banging, Fusetti explains that already the scaffolding is being taken down as the work of cleaning and restoring progresses from the apse toward the entrance.

Stretching a brush out to a wall fresco like one of Giotto's assistants, a restorer in a white lab coat dabs watercolor pigment from a palette along a filled crack, taking great pains to follow the lines of existing brush-

strokes. "This area was badly hit, so it may take her a full week to paint over the cracks just in these two square meters of fresco," Fusetti explains.

Farther toward the entrance, he stops on the highest level of scaffolding at the august image of Saint Augustine—one of the vaults attributed to Giotto and his assistants—to show me how the cracked frescoes of winged rabbits, griffins and other mythological beasts are treated to keep them from flaking away. With surgical precision, restorers hold an overlay of rice paper against the frescoes, then brush the surface with acrylic resin to consolidate the pieces and bind the paint to the plaster and supporting walls beneath.

Almost close enough to touch, Augustine sits on his pale-aqua throne, inclining his venerable mitered head toward the spanking new rebuilt vault where Saint Jerome had been. The bare bricks of the vault appear particularly naked against the riot of colored frescoes surrounding them.

While Fusetti spends his days clambering over a gargantuan Erector set of scaffolding, the indefatigable Paola Passalacqua from Italy's Central Institute for Restoration labors over the world's most daunting jigsaw puzzle. In the cavernous former stables of a 15th-century pope, deep below both churches and the Sacred Convent, Passalacqua and her team of 15 expert restorers are piecing together frescoes by Giotto and Cimabue. When I visited, the restorers were scrambling to finish the Giotto saints from the archivolt by the reopening.

Spread out like patients on top of long white tables are giant blown-up photographs of the saints, ten feet long by five feet wide, all covered with transparent plastic sheets. Matching fragments have been carefully put in place on top of the plastic, their positions outlined with felt-tip pens. Luckily, the exquisitely detailed photographs were taken shortly before the earthquake as part of an exhaustive project by Ghigo Roli for U.S. publisher Harry N. Abrams to document the basilica and its artworks.

Workers circle the supine saints, trying to pinpoint the location of fragments based on their color, brushstrokes, preexisting cracks and other defects. When as many fragments as possible have been assembled on curved supporting panels, Fusetti's team of restorers will fill in the gaps with painted cross-hatching.

"From close up, you'll be able to see where the fresco has been reconstructed," Passalacqua points out. "But from the floor, you won't be able to notice."

In the days following the earthquake, cultural officials despaired that any of the collapsed frescoes could be salvaged. "Initially, there was no intention of putting the fragments together," says Passalacqua. "But when we began to find enough to reconstruct faces and hands, those of us working on the site became convinced the frescoes could be put together."

For Passalacqua and the many volunteers who arrived unbidden, sifting through the rubble for bits of colored fragments was an act of faith. Passalacqua, a fiery brunette with disarming chutzpah, discovered she had a gift for evangelizing the cause—with an

Clockwise, from top left: Paola Passalacqua is coordinating the reassemblage of the fallen frescoes, including *Saint Jerome and a Monk* (pictured behind her) from the vault attributed to Giotto; early on, salvaged fragments are superimposed on a life-size photograph of Giotto's *Saint Benedict*, now nearly 80 percent complete; restorer Beatrice Dominici uses a syringe to inject a special mortar between the bricks of a damaged vault; another member of the restoration team uses a soft brush to clean a section of fresco.

unexpected boost from Saint Rufinus.

When the media first descended on the basilica, the quick-witted restorer elatedly held up the broken, but clearly recognizable face of the saint from the collapsed archivolt as triumphant proof that the impossible could be done. "The rest of the world was sure the frescoes were going back up, even though the officials weren't," she recalls with a sly grin.

Passalacqua's stubbornness has paid off. Once-lukewarm cultural authorities have since prevailed on the Italian government to finance a brand-new lab. The size of a basketball court, the lab is tucked out of sight behind a cloister adjoining the Lower Church and will be equipped with high-intensity lamps, aerators to vent fumes and a bank of computers.

When I visited, Passalacqua was already in the process of moving into the new worksite. Stacks of trays filled with fragments and orange crates containing frescoed bricks were ranged along the walls. All told there are about 3,000 trays of fragments and bricks still to be reassembled.

While the Giotto fragments are being recomposed by hand, the Cimabue fragments are too fragile. Unlike Giotto's works, done in the long-lasting fresco technique in which paint is applied to wet plaster, Cimabue's were painted *a secco*—on dry plaster. "Each time you touched the Cimabue fragments, they became smaller," Passalacqua explains.

"The rest of the world was sure the frescoes were going back up, even though the officials weren't."

Enter the computer era. Using 3-D virtual imaging and an unlikely blend of high-tech and the restorer's art, engineers from La Sapienza University are devising an ambitious program to piece together the 100,000 Cimabue fragments. In the first step of the computerized recomposition, a technician from the university worked with two restorers in Assisi taking digital photographs of all the fragments and bricks and stored them on 290 computer disks. Compiling this digital archive was a massive undertaking, requiring five months to consolidate and mount the fragments, four linked computers and a specially designed camera snapping away ten hours a day for nine weeks.

Every fragment now has an assigned number, explains Domenico Ventura, the youthful restorer in charge of digitizing the fragments. The computer program will try to match up each fragment to the master photographs. Unlike a restorer, the computer is able to store the size, shape and color of all the pieces in its memory. As more and more fragments are matched up to the photographs, the program will become increasingly accurate in pinpointing the exact location of each fragment.

Instead of cybermagic, Passalacqua and company continue to rely on resourceful determination and intuitive skill. A student restorer at Assisi in the early 1980s, Passalacqua is driven by a deep-seated obligation to put the frescoes back on the ceiling. "It's not an artistic option; it's a moral necessity," she says.

Despite her persuasive conviction, a number of vocal critics insist that trying to reconstruct the frescoes is a waste of time. The late Federico Zeri, one of Italy's foremost art historians, told the *Times* of London in February 1998 that there was "absolutely no hope" of piecing the fragments back

Above, left: An elaborate web of steel-tube scaffolding, erected in the basilica to help support the vaults and protect them in the event of more tremors, brackets the void left by the collapsed section of vault bearing Cimabue's *Saint Matthew and Judea* and a section of starry sky. Above: A worker replaces damaged tiles on the roof of the Upper Church.

together. He suggested putting "the few fragments we have . . . in a museum" and saying to visitors: "this is all that is left of what used to be."

Even a sympathetic critic like Elvio Lunghi despairs of seeing the original frescoes back in place. "There are simply too few fragments to go up," he maintains. "I say this as someone who spent all night with the firemen after the earthquake, shoveling rubble out of the church and a month afterwards sifting it to search for fragments."

Lunghi's proposal is to commission a figurative artist to execute a new work for the reconstructed vaults. Others favor installing reproductions of the frescoes or projecting photographic images of them onto the new vaults. At the time this article was going to press, a final decision about what to do had not been made.

Whatever the passions and aspirations firing those intent on resurrecting the basilica to its former glory, there's an uncanny echo of the event that inspired Francesco di Bernardone to revolutionize the faith nearly eight centuries ago. Entering the crumbling church of San Damiano near Assisi, the 24-year-old Francis heard Christ on the crucifix speaking to him.

"Can you not see that my house is falling down?" asked the figure, in a metaphorical plea for Francis to renew the troubled established Church. "Go then and repair it for me." And so he did. Each in their own fashion, the restorers of Assisi have heard a similar call.

Richard Covington writes about culture and art from his home near Paris. Photographer Romano Cagnoni lives in Pietrasanta, Italy.

The "Sea Canary"

Sings the Blues

THE BELUGA WHALES OF CANADA'S ST. LAWRENCE RIVER HAVE ENDURED A LOT OVER THE YEARS, BUT THEY'RE STILL AROUND, AND STILL CONTROVERSIAL

BY STEVE KEMPER

BELUGAS SURROUNDED US AGAIN, SLIPPING through the dark-green St. Lawrence River like ghosts. There were nine this time: five big white adults, three gray juveniles and a new calf, mousy brown. The calf swam awkwardly, occasionally heaving its upper body out of the water like a child trying to catch its breath and get a better view. At first, it stayed close to an adult, probably its mother, sometimes rubbing against her, snug in the tuck of her easy, graceful undulations. Then it veered toward us. Just before it arrived, the adult surfaced and abruptly cut it off, as if to say: "No, you can't play with boats."

The 26-foot-long *Bleuvet*, a research vessel, was the least of the dangers the calf faced. In some ways, Canada's St. Lawrence River is an ideal place to raise a beluga. (Technically, it becomes an estuary between Montreal and Quebec City, but the people here call it a river.) The Labrador Current sweeps through the Atlantic, washing a mother lode of marine life up the Gulf of St. Lawrence and into the Laurentian Channel. Unlike the 80,000 to 100,000 belugas that live farther north in the Arctic, the St. Lawrence contingent doesn't migrate long distances through dangerous seas, doesn't face predators such as orcas and polar bears, and isn't hunted by humans.

Lots of food, no predators—sounds like paradise. Yet Canada classifies the St. Lawrence beluga as endangered, and its numbers don't seem to be increasing at a normal rate. The most likely explanation might be that their enemies here are more difficult to elude than orcas and polar bears—sewage, pesticides such as DDT and mirex, and industrial

No longer hunted for oil, as in the 1920s (above), a St. Lawrence beluga today (left) has less to fear from people than pollution.

On the research vessel *Bleuvet* (above), Robert Michaud prepares to dart a beluga. In the lab (below), he removes a biopsy sample from the dart tubule for genetic analysis.

substances such as lead, mercury, PCBs and benzopyrene, dumped for decades into the river and its sources, including the Great Lakes. The contaminants accumulate, especially in sediments, and consequently in marine species. Belugas, at the top of the river's food chain, ingest and store more of them than many other species.

These poisons have been linked in some mammals to low birthrates, damaged immune systems and cancers. St. Lawrence belugas show an alarming incidence of cancer, similar to the rate found in humans and dogs, but high for wild animals. The poisoning begins early. The baby beluga that approached the *Bleuvet* was nursing on milk that carried toxic additives.

The news isn't all bad. The United States and Canada have worked hard to clean up the Great Lakes and the St. Lawrence, and a new method of counting the whales suggests that their numbers could be twice the previous estimates of 500 to 700. Still, controversies abound. In 1996, a Canadian scientist who had studied belugas for years published an elegiac book that concluded that they were "doomed." That same year, a researcher from the environmental group that operates the *Bleuvet* told a reporter, "For us, it is without question a species on the road to disappearing." Yet not long after that, the *New York Times* carried a story, based on the work of a Canadian government scientist, that said the St. Lawrence beluga was "thriving," and "one of modern ecology's great successes," with a population rising in 20 years from 300 to 1,000. This new estimate, which has since been increased to more than 1,200, hasn't been accepted by everyone.

Like Herman Melville's white whale, the St. Lawrence beluga carries a heavy load of symbolism, some of it contradictory. Its striking color and perpetual "smile," its proximity to humans and its endangered status make it an attention-getting poster mammal, useful to scientists seeking grants and conservation groups seeking donations. Whether belugas are actually "thriving," as the new estimates suggest, remains a point of contention. Scientists note that the higher number doesn't indicate a growing population, only a better-counted one.

Standing in the bow of the *Bleuvet*, his legs spread wide to counterbalance the waves, Michel Moisan sighted and pulled the trigger. The arrow missed its target and snicked into the water. Three white flukes simultaneously flipped up and disappeared with a splash. Two other groups of belugas—50 yards ahead of us and 50 yards off the other side—dove at that same moment. A bit chagrined, Moisan netted the floating arrow. He was still adjusting to a new crossbow, painted with camouflage colors. "We should be able to sneak up on the whales now," he joked.

A wildlife-management technician, Moisan has shot about 50 belugas in the past five years, using arrows tipped with a hollow tubule that removes a one-inch plug of white skin and blubber. He also shoots the animals with his camera, so he can match the plug to its source. The organization he works for in Tadoussac, Quebec, Groupe de Recherche et d'Education sur le Milieu Marin (the Marine Mammal Research and Education Group), or GREMM, has compiled photo-IDs on about 460 belugas. Biologists are analyzing Moisan's biopsies for DNA, hoping to track lineages and gather clues about the social formation of various groups, called herds.

Moisan and the *Bleuvet* are on the water most summer

H. HUGUES (2); P. 86 BRIAN SKERRY; P. 87 ST. LAWRENCE NATIONAL INSTITUTE OF ECOTOXICOLOGY

days, looking for belugas. One August morning we left Tadoussac about 6:15 and headed downstream. Moisan's assistant, Ian Wyndlow, stood lookout on the flybridge, bundled in thermal layers against the chill. As we crossed the river toward St.-Simon, Wyndlow began tap dancing on the roof, a signal. Moisan nodded and pointed into the distance: "Belugas." They looked like snowballs or half-moons, rising and disappearing in the green water.

We tailed them for more than an hour. Moisan snapped pictures and talked into a recorder, noting the number of whales, the composition of the group (adults, juveniles, calves), location and direction, and behavior. The data would be entered into GREMM's computers. "We want to know who's been seen with whom, and where, and whether they have territories," said Moisan. "Then we'll be able to learn about their social structure."

After lunch we approached the choppy confluence of the Saguenay River and the St. Lawrence. It's a popular site with belugas because the Laurentian Channel dead-ends in steep underwater cliffs here, creating a rich upsurge of marine life. Ahead of us, eight big adults up to 15 feet long swam alongside each other in a solid row, like football linemen. "Probably males and probably familiar," said Moisan as we cruised closer. "Yes—there's Twik . . . and Gorby . . . and Virgule [French for 'comma']."

He recognizes about 150 belugas by sight, quite a feat since they're visible for only about five seconds at a time while breathing, and their heads barely break the surface. He looks for each whale's distinctive graffiti: scrapes, gashes, pocks, dents, welts, notches, squiggles and combination patterns. GREMM identifies most of the belugas only by numbers, but more than 90 have been "adopted" and named by corporations, community groups and schools, who have donated $5,000 each to support GREMM's work.

Moisan sees some individuals 10 or 15 times a summer, generally in the same location, with the same companions. The big old female named Slash, for instance, always shows up in the Saguenay or near its mouth, accompanied by a band of female cronies. The belugas also seem to congregate in certain areas of the river according to gender and age, which suggests a complex territorial social structure. Males, single or in close-knit fraternities of up to 20, favor the colder, deeper waters north of the Saguenay. Females with calves tend to live in communes of 20 to 35 upstream from the Saguenay, where the St. Lawrence is shallower and warmer. Males, females and gray juveniles seem to mix more loosely on the river's southeastern side. But all these observations are preliminary, cautions Robert Michaud, GREMM's president and research director, who has been gathering data on the whales since 1985. "We

In his office, Michaud (above) registers new beluga photographs in a catalogue of known whales. He and his associate Michel Moisan (below) are convinced belugas remain endangered.

J.P. SYLVESTRE; CARL D. WALSH/AURORA

A calf sticks its head out of the water and looks around; scientists refer to this common behavior as "spyhopping."

can't dive and track them, so we're stuck with glimpses from the surface."

On my first day aboard the *Bleuvet*, we saw a blue whale, a dozen minke whales, some fin whales, a few seals and harbor porpoises, and about three dozen belugas. But the second day was extraordinary. We saw at least 100 belugas, including the baby that approached our boat. From midafternoon on, we were encircled by what Moisan called "a continuum of whales." Most steamed sedately along, taking from two to ten breaths and then diving for five or six minutes. Some investigated us. The gray juveniles were especially curious and persistent. They blew huge bubbles that fizzed around the boat. Half a dozen of them entertained themselves (and us) by cruising just behind the propeller. Some of the big whites occasionally moseyed over to see what the kids were up to, but they soon moved off—too old and wise, perhaps, to enjoy heavy metal. A few loiterers lost plugs of flesh to Moisan's archery. "More sushi!" he announced.

As the light softened in late afternoon, even more whales appeared. Wyndlow shut off the engine, and we drifted into a magical interlude. Belugas scalloped the surface in graceful parabolas. The quiet amplified the sound of their exhalations—quick chuffs, like someone clearing a snorkel—and also their strange prattle. Sailors nicknamed belugas "sea canaries" for their repertoire of vocalizations, audible belowdecks as well as above. Rocking on the St. Lawrence, I heard calls that resembled a whistling teaket-

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tle, a squawking seagull, an angry duck and crackling static.

Scientists don't understand this tonal language, which is produced by air forced rapidly between sacs near the blowhole. Belugas may use the calls for hunting, courting, warning, or keeping the herd together. Maybe sometimes they just like to sing and chatter. One big white adult came over to see what we were up to. He swam on his side just beneath the surface, tilting his head to study us with his dark eye and Mona Lisa smile. Wyndlow suddenly waved. It seemed a natural salute, one curious mammal to another.

Because belugas are among the most thoroughly studied of cetaceans, we know a lot about them. Males can reach 15 feet and weigh 3,000 pounds, females 13 1/2 feet and 1,900 pounds. Since females gestate calves for 15 months and nurse them for two years, they can reproduce only every three years. Consequently, a small population can't increase quickly, even though an individual's life span may run to 35 years or more.

Where most cetaceans have a dorsal fin, belugas have a knobby ridge, possibly an adaptation for swimming beneath ice. They seem slow and placid in disposition, rarely breaching or porpoising. They can dive as deep as 2,100 feet. They eat fish, eels, crustaceans and other bottom-dwelling creatures. Scientists believe that their echolocation system is one of the most sophisticated among cetaceans. A beluga produces high-frequency "clicks" that pass through its melon, the bulbous forehead that can alter its shape like a squeezed water balloon. Scientists believe that the melon focuses clicks into beams that bounce off objects and return as echoes that are received by a cavity in the lower jaw and conducted, ultimately, to the brain. Belugas have been trained by the Russian Navy to locate enemy submarines using their sonar.

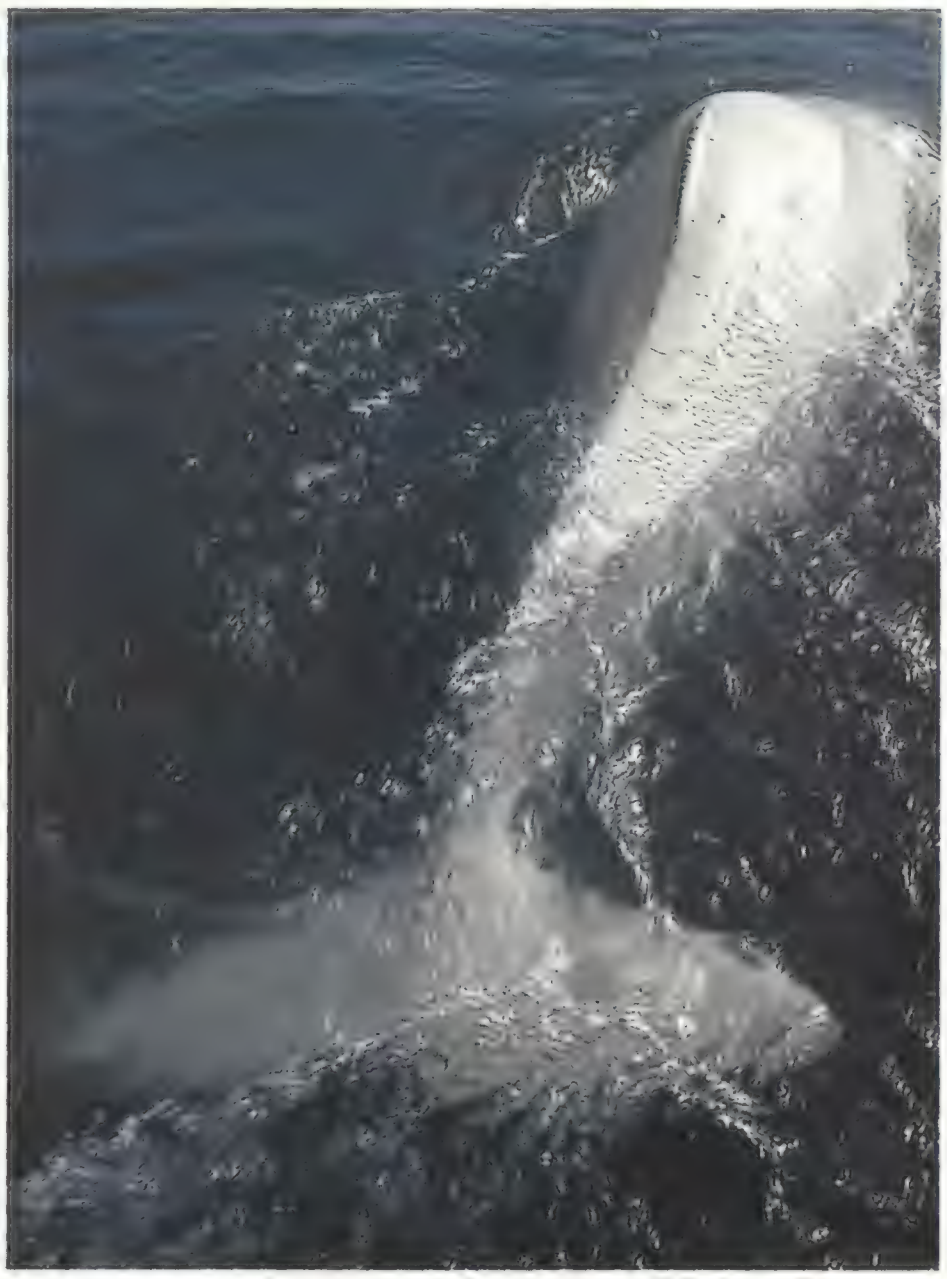
In winter, St. Lawrence belugas seem to drift toward the gulf, staying ahead of the forming ice, but they remain in the river system all year long, a peculiar colony of isolated homebodies that hasn't left since the end of the last ice age, 12,000 years ago. They are what biologists call a "remnant population," disconnected from the main group.

Their isolation nearly destroyed them. Archaeology shows that Indians hunted St. Lawrence belugas for hundreds of years, but the whales' real troubles began with the arrival of European settlers. Between 1500 and the 1950s, and most intensely between 1860 and 1945, the whales were hunted by boat or trapped in weirs and slaughtered, sometimes by the hundreds. Beluga skin made soft leather, and the fine oil went to lubricate precision machinery such as watches. Because it was close by and easy to catch, the St. Lawrence beluga became one of the first cetaceans exhibited in captivity. The showman P. T. Barnum put a number on view in New York City in the early 1860s, and a beluga was exhibited in London in 1877.

In the late 1920s, when the catch of cod and salmon dropped in the St. Lawrence, fishermen blamed belugas—100,000 of them, by one estimate, an exaggeration of at least 90,000. Anti-beluga hysteria swept the river. There were rallies and speeches. The government finally declared war on the whales, issuing rifles and ammunition to fishermen. The madness reached its apogee in 1929, when officials hired a former fighter pilot to wage a bombing campaign against the whales. When this didn't eradicate them, the government offered a bounty of $15 for every pair of beluga flukes.

Then in the late 1930s, scientists examined the stomachs of more than 100 belugas that had been killed by hunters. They found one salmon, a few cod and almost no other commercially valuable fish. Their report demolished the myth of gluttonous, cod-stuffed belugas, and the eradication program quietly ended.

For the next 40 years, the Canadian government ignored



A beluga exposes the distinctive knobby ridge on its back that may be an adaptation for swimming under ice.

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the St. Lawrence belugas. Hunters didn't even need a permit to kill them, and whales were being taken into the 1970s. By then they were also facing more insidious assassins—habitat loss and toxic industrial pollutants. Their range had contracted severely, from 30 miles upstream of Quebec City in the 1940s to 100 miles farther downstream. The population had withered to an estimated 300 to 350, compared with 5,000 to 10,000 earlier in the century. In 1983, the Canadian government realized that this unique mammal was slipping toward extinction, and belatedly decided to protect it by declaring it endangered.

Michael Kingsley thinks it's time for yet another change. Before retiring in 1997, he worked as a research scientist for Canada's Department of Fisheries and Oceans (DFO) in Mont-Joli on the lower St. Lawrence. He is now a senior scientist for the Greenland Nature Institute. On the basis of his extrapolations from aerial surveys, Kingsley believes that the beluga population is much higher than previous estimates and is increasing. When the Committee on the Status of Endangered Wildlife in Canada met two years ago to consider down-listing the beluga from endangered to threatened, largely because of Kingsley's work, he argued that the whale no longer meets the criterion for endangerment: an animal about to disappear because of a declining population. He convinced 12 of the 21 voters—just short of the two-thirds majority required to change an animal's status. "Some people's funding depends on low numbers," says Kingsley. "The motive for keeping belugas endangered is financial." Two years ago, he managed to ruffle more feathers by telling an international conference of marine-mammal scientists that there are 1,000 belugas in the St. Lawrence.

Statistics carry an aura of precision, but Kingsley readily admits that estimates based on aerial surveys contain "a large degree of statistical error." Here's how it works: a plane flies transects over the river and takes photographs; then a reader counts the belugas visible on the film. Several things may affect accuracy—the weather, the film, the turbidity of the water, the skill of the reader. Next, a statistician such as Kingsley takes the raw count and applies "correction factors"—for glare, perhaps for overlapping images and, most important, for submerged belugas. For many years, statisticians have added 15 percent for those invisible whales.

In the late '80s, researchers began putting radio tags on Arctic belugas and discovered that, at any given moment, *half* of a group's whales were submerged. Kingsley began wondering why it should be any different in the St. Lawrence. Under his direction, a graduate student named Isabelle Gauthier devised a new way to count belugas from the air: she used a helicopter, which allowed her to stick with a group and get a more accurate count.

FLIP NICKLIN/MINDEN PICTURES; P. 92 TONY MARTIN/OXFORD SCIENCE FILMS

After taking several breaths, this quartet of belugas in the Gulf of St. Lawrence will dive the same way they surfaced: together.

Gauthier presented her findings at a big congress of French-Canadian scientists last year. She demonstrated why the correction factor for invisible whales should be more than 100 percent. Afterward, the room was very quiet. No one could fault her methodology. She had suddenly doubled the number of belugas in the St. Lawrence. "The environmental groups shouldn't be upset if the number is over 1,000," Gauthier told me. "It's still only a few animals. They're afraid that people will think there's no longer any danger, and that's not the case."

Because of the belugas' slow reproductive cycle, Arctic herds grow by a glacial 4 percent a year. But the St. Lawrence group's rate is below even that. Various reasons have been suggested. Maybe there's a high neonatal death rate because of contaminants. Maybe older females have problems conceiving and nursing because of abnormalities caused by poisons absorbed while they nursed during the river's noxious past. Kingsley's theory is that overhunting during the '60s and '70s may have decimated the more easily caught juveniles and created a reproductive vacuum. He predicts "a pulse of reproduction coming on" as newer generations enter their procreative maturity.

Kingsley questions the link between contaminants and cancer in belugas. "The evidence is not very good," he says. As for the unusually high rate of cancer, he says: "Whether it's because they're living amidst carcinogens or because there's nothing else to die of, I don't know. We're examining dead belugas that wash up, so the fact that they have diseases isn't surprising. The question is, is what they're dying of unnatural for belugas to die of?"

Daniel Martineau answers that with an emphatic yes. A professor of pathology at the University of Montreal, he points out that many of the beached belugas are so riddled with toxic compounds that Canadian law classifies them as hazardous waste. Martineau and a team of pathologists examined more than 100 beluga carcasses between 1983 and 1997. About 20 percent of the adult whales died from cancer, and many others were afflicted by it in various organs. These rates are unheard of among wild animals and are far higher than those of any other cetacean.

Martineau and his colleague Pierre Béland, who is a research scientist with the St. Lawrence National Institute of Ecotoxicology in Montreal, are convinced that some of these cancers are linked to carcinogens used in industrial processes, which contaminate sediments where belugas feed. "We know that these whales are exposed to substances that have been found carcinogenic in vertebrates," Martineau notes, "and that these substances have caused cancer in lab animals."

Martineau and Béland pin the whales' low birthrate at least partially on PCBs, which disturb the hormonal balance necessary to conceive and carry a fetus. "This is well-supported in virtually any animal that has been tested," Martineau says, "and St. Lawrence belugas have one of the highest levels of PCBs found in animals." He also has detected evidence of weakened immune systems.

Sometimes he finds toxic chemicals that puzzle him. Mirex, for instance. This insecticide was processed until 1975 at a factory on the Niagara River near Lake Ontario and was used mainly against fire ants in the American South. It has been banned in the United States for 20 years and barely shows up in tests of the St. Lawrence. Yet Martineau found high concentrations of it in the belugas' blubber.

Béland, author of *Beluga: A Farewell to Whales*, traced the mirex to eels. Eel larvae born in the Atlantic swim into the St. Lawrence and make their way to Lake Ontario, where they live until maturity, about ten years. As they feed, they absorb old contaminants. Every fall, adult eels migrate back down the St. Lawrence to the Atlantic to breed. Béland suspects that belugas gorge on those eels.

So far, Martineau has found more than 25 toxic substances in the blubber of autopsied belugas. "The more analyzers we get and the more tests we do, the more com-

Researcher Pierre Béland, examining a beluga carcass, traced poisons found in whales to contaminated animals they eat.

pounds we find," he says. The most recent was tributyltin, a pesticide used in boat paint. "I couldn't see how the belugas could be contaminated by that," he says, "but there is heavy marine traffic in the St. Lawrence and the sediments are contaminated, and belugas are toothed whales that feed on the bottom."

To Martineau and Béland, the links are clear between contaminants and the belugas' health. "But there is no absolute proof," says Martineau, "so it becomes politics."

More than a decade ago, whale-watching was a modest industry in Tadoussac, with only a dozen or so boats taking out a total of 50,000 visitors each year. Now there are 50 boats, and more than 300,000 people come annually from all over the world to see whales in the St. Lawrence. This explosion of whale-watchers worries everyone who worries about belugas. It's illegal to harass whales, but Moisan and Wyndlow say that although some captains follow the rules, others zoom up to whales, or chase them, or zip between them in Zodiacs. When one boat spots whales, others come roaring over. At one point while on the *Bleuvet*, I counted 24 boats huddled around a group of fin whales. Last year, whale-watching boats off the New England coast killed a minke and injured a humpback. It's not unreasonable to assume it's just a matter of time before the same thing happens here.

No one knows how all this affects the whales. A GREMM biologist studying fin whales found that when cruise boats got too close, the whales shortened their dives and hence spent less time feeding. "So it could have an impact on their energy budget," says Robert Michaud, "and it happens to them over and over, all summer." Michaud would like to see a moratorium on new whale-watch boats.

Nadia Ménard is a biologist for the new Saguenay-St. Lawrence Marine Park, 450 square miles of water centered on Tadoussac. Last year, she invited whale-watch captains, scientists, tourism representatives, and state and local officials to a workshop. The results surprised her. Most of the participants agreed that the voluntary code of ethics now in effect concerning belugas should become compulsory, that boats should spend no more than an hour near whales instead of the current two hours, and that the whale-watch companies should diversify by teaching visitors about the entire marine ecosystem. Almost everyone agreed that habitat especially important to belugas, such as Baie Ste-Marguerite in the Saguenay River, should be off-limits to boats. "There's a lot of work ahead, but I'm generally optimistic," says Ménard. "The whales are indicators of the richness of the park—ambassadors showing us that something special is going on here."

Michaud agrees that there are many reasons to be hopeful. "The situation is probably less critical than we thought ten years ago," he says. "But the whales are still dying of cancer and they are still living with a high level of contaminants. Down-listing them would come with the implication that the situation is improving. That could be dangerous." He worries that the new population estimate or a less grim classification might nudge the public and the government toward complacency, relaxed regulations and lower funding.

Science, environmentalism and politics converge upon the St. Lawrence belugas, sometimes pulling in different directions. That curious baby I saw approaching the *Bleuvet* was born into an environment not that much healthier than the one his grandparents knew. There is at least the promise, nowadays, of a better future. It remains to be seen whether that promise will be kept.

Steve Kemper, a freelance writer who lives in Connecticut, profiled the Arizona Poison and Drug Information Center in the September issue. His story on salt appeared in January.

FLIP NICKLIN/MINDEN PICTURES

Mrs. Charles' story has two happy endings.

One story concerns the common plight of the elderly in a nursing care facility who crave more companionship.

The other is about special needs students: kids whose learning and behavioral problems usually result in too much anger and too little self-esteem.

Faith Charles has a novel approach to both problems: her special needs classes make monthly visits to the California Armenian Home. These visits are especially welcome during the holidays when the students put up decorations, sing carols, make crafts and generally add some holiday cheer to the residents' lives.

Yet, Mrs. Charles' kids may actually receive more than they give. Their self-esteem increases from learning that they can make a real difference in someone else's life. What's more, the activities they share with the residents improve their reading, writing, art and communication skills.

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ON THIS UNTAMED STRETCH OF CENTRAL CALIFORNIA COASTLINE, DREAMERS AND DROPOUTS HAVE CLAIMED A CORNER OF PARADISE

Big Sur

BY ROBERT WERNICK

PHOTOGRAPHS BY CATHERINE KARNOW

THE PEOPLE WHO LIVE IN the Big Sur country divide the people who drop off Highway 1 to see them into two distinctly identifiable categories.

There are the tourists, who complain that there are no telephones or televisions in the motel rooms and who say, as they wait at the gas pump, Where exactly is all this wonderful scenery everyone keeps talking about, all I see is trees.

And there are the visitors, who stand and look around, and after a while they see a wisp of white fog coming up a dark gully as a faint mixed scent of kelp and yerba buena floats through the air. Or there is a giant condor circling overhead, or a sea otter scraping mussels off a rock

At their ocean-edge garden, Kate Healey and daughter Isabella gather herbs from a two-acre plot.

Poet Robinson Jeffers, who arrived in Big Sur in 1914, handbuilt his Hawk Tower (right) of boulders eroded from cliffs.

in the spray on the beach at the foot of a thousand-foot cliff, or a whale spouting out in the endless Pacific, and they say, There is something magic about this place.

"Magic," which used to be a severe technical term, is now an all-purpose word meaning anything distinctly out of the ordinary. And as such, it is a perfectly accurate descriptive word for Big Sur. There is nothing precisely like it on this planet.

Everyone who has ever got beyond the tourist stage on this narrow 75-mile stretch of central California coast, running just south of Monterey to Carmel, and nearly to San Simeon, has at some time had the feeling, exhilarating or uneasy or simply puzzled, of being on an edge. The Ohlone Indians, who lived just north of here for hundreds, perhaps thousands of years, have left behind them a song of which the refrain is "Dancing on the edge of the world."

You find yourself always on the edge in Big Sur, on the edge of cliffs plunging down into the sea, on the edge of California where the bungalows and the billboards stop at last, on the edge of the United States where the bustling contrapuntal progress of the American dream bangs head-on into the angry monotony of the Pacific Ocean.

Geologically speaking, the Big Sur country is not part of the United States at all. It is the cutting edge of the Pacific Tectonic Plate, one of the dozen or so components of the current crust of planet Earth, which for the past 29 million years has been grinding its way northwestward against the edge of the North American Plate, causing fearful landslides and earthquakes as it goes, at approximately the speed of a growing human fingernail.

No wonder that the land bears everywhere the imprint of chaos, rock layers twisted and bent like the limbs of photographer Edward Weston's cypress, the kind of tree that "the sailor wind works into deep-sea knots," says the poet Robinson Jeffers. No wonder there is an extraordinary jumble of vegetation here: redwood from the damp northern forests growing across the hill from yucca of the southern deserts, tan oak and sycamore and willow and big-leaf maple and madrona, and the Santa Lucia fir, which is found nowhere else on earth, all packed together like riders in a subway (one authority has counted 344 species of tree and shrub and grass squeezed into one patch of

LEFT: CORBIS/BETTMANN-UPI

4,000 acres). Nowhere else will you see such a range of the color green in a narrow strip of landscape, from the pale absinthe of denuded hilltops to the terrible dark of cliffside gorges.

The climate here is technically known as Mediterranean, with wet winters and dry summers and reasonably moderate temperatures the year round, more pleasant than the Mediterranean itself because cold water rising out of offshore sea canyons thousands of feet deep breeds fogs—which tends to annoy the tourists. But the fogs also temper the summer heat and help keep down the fires that periodically threaten to destroy every living thing between the mountaintops and the sea.

It is a richly tormented landscape that never was, and never will be, fit for large-scale human habitation. And for all but a brief recent flicker of time, sensible humans have carefully avoided it.

It is a richly tormented landscape that never was fit for large-scale human habitation.

Anyone who has ever come to Big Sur, says Esther Ewoldsen, whose grandfather established a homestead here more than a century ago, has been running away from something, whether the law or their family or their creditors. The Esselen Indians retreated here 2,000 years ago, forced to share the game of the rugged countryside with the grizzly bears, and the limpets and mussels clinging for dear life to the tidal rocks, with the pelicans. In colonial days, when it was known as *el país grande del sur,* "the big country of the south," meaning the inaccessible stretch of coast south of the provincial capital of Alta California at Monterey, it was a dark trackless wilderness, where outlaws hid out from service in the armed forces of Spain and Mexico, as draft-dodgers would later hide out from the American Army during the Vietnam War. Smugglers quartered here, and trappers like Jedediah Smith, who, after they had exterminated the beavers from the Rocky Mountain country for the European hat trade, came here to hunt the sea otters prowling the coastal waters. (Those creatures were to be saved from being exterminated themselves only by the spread of false rumors that they were already extinct.)

For a brief period toward the end of the 19th century, there was some logging of tan oaks to provide tannic acid for the leather trade, some gold mining, some quarrying of limestone, but nothing remains of them except a few scars on the landscape. Adventurous voyagers might drop by, like Robert Louis Stevenson, who used the scenery as a backdrop for the tale of *Treasure Island,* which he was making up for his stepson. A few hardy souls got their 160 acres under the Homestead Act of 1862 and tried with difficulty to make a living by farming or ranching on what small amounts of relatively level ground were available among all the cliffs and arroyos.

It was still a lost world when the young poet Robinson Jeffers came down to Big Sur with his bride, Una, in 1914. There was no paved road on the 40-mile stretch from Monterey to the tiny village of Big Sur, and it took all day to cover it in a horse-drawn coach. A quarter-century later he wrote of this journey:

"There had already been strong storms that winter and at Soberanes Creek the cypress trees around the farmhouse were blown to pieces. Sea-lions roared on the Lobos Rocks off shore, while the man of the house told us that last night his hundred-pound grindstone, which he kept by the back door, had been blown around the house to the front steps; here it lay. In the gorge of Mill Creek we changed horses, near a lonely farmhouse where an eighty-year-old man lay dying; he was dying hard, he had been dying for a week. On a magnificent hillside opposite a mountain-peak stood a comparatively prosperous farmhouse, apple trees behind it, and the man who lived there had killed his father with rat-poison and married his step-mother. There were only five or six inhabitants in forty miles, but each one had a story. We came down to the Sur River, and passed the albino redwood that still grows there, shining in the forest darkness, shoots of snow-white foliage growing from the stump of a lightning-struck tree: not a human story, but strange enough to be."

All of what was to be the world of the Jeffers poetry was there, the awesome scenery, the melodramatic tales of the torn and twisted souls stranded in it, the sense of a brooding danger, the sense, above all, that this was the end, the final point in both time and space of Western civilization.

Jeffers was to be the harbinger and

ARTHUR HEALY/HENRY MILLER LIBRARY

Novelist Henry Miller, here with his fourth wife, Eve, lived in Big Sur for 18 years.

bard for the still-continuing wave of runaways to hit Big Sur, the refugees from the materialistic, consumeristic culture of modern America.

In his daily life, Jeffers was a handsome, charming and talented man. He left a physical monument in the form of his house and looming tower. He built the tower by hand, by himself, out of huge boulders eroded from the cliffside by the giant waves that daily crash against the shore. From the beginning, it has been a shrine for his admirers, who in his lifetime ranged from Charlie Chaplin and Charles Lindbergh to George Gershwin and Aldous Huxley, who saw him as a reincarnation of the ancient Greek tragedians. It was meant to stand in magnificent isolation, dominating acres of wild land beside the pounding sea, but it is now just one more dwelling among many behind hedges on a quiet street in what has now become the tasteful, gallery-rich community of Carmel-by-the-Sea. Visitors file through it in silence as they file through museums; they see the room in the tower where the poet paced to the sullen beat of the waves as he composed his lines.

"Walk on gaunt shores and avoid the people" was his advice to the world. And Jeffers enjoyed the company of his contemporaries, heirs to the Romantic tradition, who turned their backs on it all. Those poets and painters of the San Francisco Bay region, by the opening of the 20th century, found themselves strangling in the conformist and hypocritical atmosphere in what had once been the wide-open world of the forty-niners. (As late as 1946, my friend C. F. McIntyre, translator of French poets, was, or so he recounted, fired from the faculty of the University of California at Berkeley because he insisted on wearing a beret.)

Led by George Sterling, the poet laureate of San Francisco, they built

"Walk on gaunt shores and avoid the people" was the advice Jeffers proffered to the world.

themselves little cabins or houses in the wasteland near the ruins of the 18th-century Carmel mission.

Life in Carmel might be noisily cheerful—one of its chroniclers refers to it as a perpetual beach party—but there was always an undertow of dissatisfaction. As the critic Van Wyck Brooks, who spent a year with all the geniuses at Carmel, observed, nobody ever seemed to get any work done. And several of their leading figures, including Sterling and his wife, ended by swallowing the cyanide tablets they carried everywhere in their pockets—a practice made fashionable by a poet named Nora May French, who prepared a poisoned sandwich for a man who had spurned her love—but a dog got it first, and she swallowed the rest of the powder out of sheer spite.

While the scattered shacks, put up as so many temples to Art, were soon to be swallowed up by galloping suburbanization, all the coastline to the south still remained a wasteland, with only a few gruff loners willing to settle down on the edges of cliffs or up in the deep, damp dark of gorges. Then, in the early 1920s, the state of California, empowered to build a road for potential defense purposes, and just perhaps suspecting that it had a tourist mecca on its hands, began to construct Highway 1 (SMITHSONIAN, June 1999) along the cliff edges, over bridges spanning the torrents, through the groves, skirting the steep mountain meadows. They used convict labor for the job, and it was hard work. The road was not finished for 16 years, and then the Depression and World War II, with its gas rationing, took people's minds off the scenic coast of central California. Electricity and telephone lines were slow to follow. It was not until 1958 when William Randolph Hearst's castle of San Simeon was opened to the public that the great flood of tourist vehicles that had been anticipated began to flow along Highway 1.

Hearst had once planned, and had sent out intermediaries, to buy all the private property in the Big Sur country. He intended to make it into a vast estate, on the order of William the Conqueror's New Forest, where he could lead cavalcades of celebrity guests and retainers from one hunting camp to another, but he ran out of funds. Other, less ambitious, immigrants were meanwhile slipping in, people who had felt the lure of this distant, isolated land: rich people looking for quiet vacation homes, veterans looking to escape their memories of war, Hollywood people looking for hideaways, artistic people looking for secret places where their genius could flower, ordinary people looking for jobs as carpenters or waitresses, loners and drifters and derelicts looking for a quiet cleft or cranny outside the whirring machine of American life, every one of them looking for something different, out of the ordinary, magic.

Orson Welles and Rita Hayworth, driving along Highway 1, fell in love with and bought a little log cabin on a ledge with spectacular views of ocean and mountain. They never found time to come back, and the cabin eventually came into the hands of a man named Bill Fassett who had drifted his way all across the country from Tennessee. He would eventually expand it into what became a restaurant, which he called Nepenthe, a Greek word that can be translated into the vernacular as "no sorrow."

Nepenthe would soon become, as it has remained ever since, the social and symbolic center of the Big Sur country life. "There was dancing every night

Holly Fassett, her daughter and granddaughter, all three accomplished artists, gather in the family cabin, which once belonged to Orson Welles and Rita Hayworth.

in those days," says Fassett's daughter Holly, now matriarch of the clan still running the place. "And such friendly, unusual people. Of course, when some of them started throwing tables at each other, I had to eighty-six them. But mostly it was just eat and drink, talk and dance, dance dance dance all night long."

The most notable of the new immigrants was Henry Miller—bunked down for a while in one of the road-building convicts' cabins—who had turned up broke in America after achieving fame in Paris as the most banned of all authors. His *Tropic of Cancer,* that marvelously high-spirited chronicle of fraternity-boy sex on the Left Bank, first printed in 1935, had been greeted by Ezra Pound with the memorable sound bite, "At last an

unprintable book that is fit to read." For many years, that title was to provide American customs officers with ample employment on the docks of New York, searching the baggage of returning voyagers for copies of the vile work disguised in innocent wrappers as the work of Hans Christian Andersen or Monsignor Fulton J. Sheen. It was not until 1961 that a memorable judiciary decision enabled works of fiction like *Tropic of Cancer*, dealing matter-of-factly with sex, to get back into the mainstream of literature where they had swum in the days of Chaucer and Boccaccio.

Royalties made Miller a rich man before he died in 1980. But he had not come to Big Sur to make money. He had come, like the outlaws of old, to live in simple comfort in an earthly paradise unencumbered by the complicated responsibilities and conflicts of modern life. He had a wonderful time. It was "one big party," in the summing up of Ephraim Doner, an artist who was an indefatigable companion in those days.

Henry Miller spent his whole life creating in more than 250 books and tens of thousands of letters a character called Henry Miller who was a wild man, a rebel, a subverter and perverter of all standards, codes and conformities, waging a war to the death against modern civilization and especially the American form of it, which he described in a book called *The Air-Conditioned Nightmare*. He was a genial, gentle, gregarious man, the greatest man there ever was to have a series of drinks with. He had a unique talent for depending on the kindness of strangers and friends to take care of him, and for generously repaying them when he had the time and the cash in his pockets. He discovered in Big Sur what Alexander Solzhenitsyn would discover in a village in Vermont: a community of independent, self-reliant people who

reminded him of Daniel Boone and Abraham Lincoln, people going their own individual, sometimes eccentric way, who would not dream of meddling in the affairs of their neighbors, but would do anything to help them out in an emergency.

Among them he had 18 sybaritic years. After the daily long hours at his desk—he was a speed typist who could and did turn out thousands upon thousands of words a day—there were always the hot baths or Nepenthe to go to, and endless jolly conversations with the endless succession of neighbors, old friends from Europe, young admirers from America, wives, aspiring writers, wild girls of the road, and curious tourists who found the way up the tortuous dirt road that led to his house on Partington Ridge.

Eventually, though, he repaired to the tony Los Angeles suburb of Pacific Palisades, where he would spend the last 18 years of his life ensconced in a columned and porticoed mansion, complete with heated swimming pool and air conditioning.

This is hardly a vision shared by the other inhabitants of Big Sur who, ever since the opening of Highway 1, have spent a good part of their time fighting to keep out developers and other forces of progress that would turn them into a Pacific Palisades. An impossible dream, but one that has been more successful than might have been foretold.

Tucked away in big houses in leafy glens or on rocky promontories, there grew up a little kernel of rich and famous and powerful people, patrician diplomats like Nicholas Roosevelt, famous architects like Nathaniel Owings and Philip Johnson, Nobel Prize winners like Linus

Inhabitants of Big Sur have spent a good part of their time fighting to keep out developers.

Pauling, show business celebrities like Kim Novak and Allen Funt, creator of *Candid Camera*, billionaires like Ted Turner and David Packard. And these were people whose voice could carry as far as the California State Legislature, which in the 1960s and '70s passed laws protecting the scenic beauty of Highway 1 and providing

that no buildings could be visible from the Big Sur section of the road.

And so, to this day, you can drive all the miles of two-lane highway through the narrow valleys or on the edge of the coastal cliffs without seeing a single billboard or movie theater or shopping mall or golf course.

It is still the kind of place where you can live for years without attracting too much curiosity or attention, where one man did live quietly for years and was regarded as a good neighbor, till someone saw his picture on television, where he was identified as being wanted for murder.

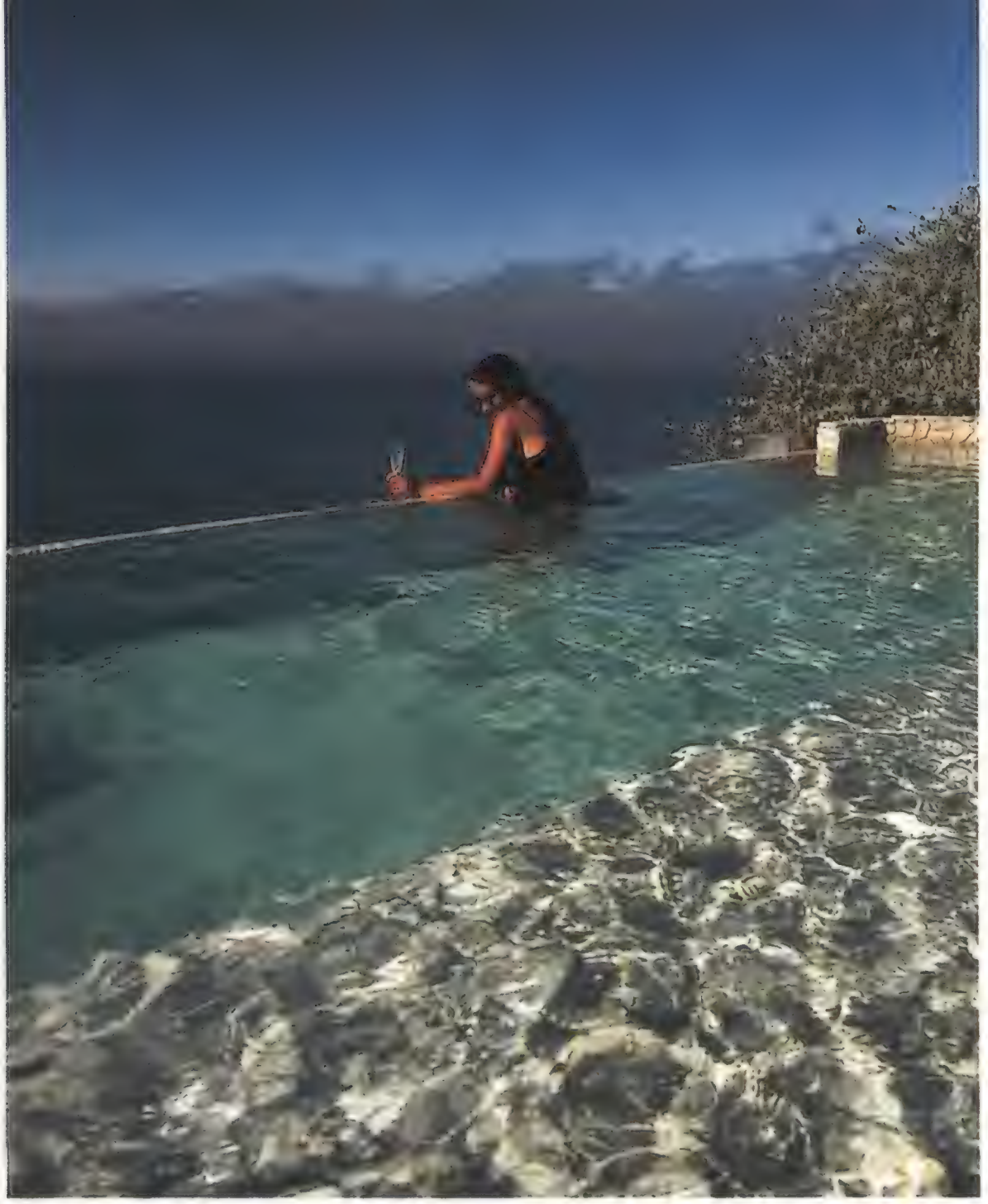
Apart from the highway, there still are only a few paved roads; for one stretch of 30 miles or so, there is no electric power except from solar collectors and a handful of generators. The hawks and kingfishers are still around, and muscular jays will steal your hamburger if you aren't watchful. On any night you may find a mountain lion come down to sniff at your door. Lupine and poppies gaily carpet the mountain meadows.

Only a few purists worry about the intrusion of alien animals and plants. They denounce the wild pigs (imported in the 1920s from Europe for hunting purposes) for digging up vegetation that had remained largely undisturbed since the Santa Lucia Mountains rose out of the sea two million years ago; and "foreign weeds" like pampas grass, imported from South America as a decorative plant, for aggressively displacing the more quiet native flowers.

(It is easier to sympathize with the complaints against another immigrant, genista, or French broom, a plant much prized for its yellow flowers by tourists who are unaware that this fast-growing weed pushes up past the slower-growing poison oak, the most common shrub in California, and absorbs some of its essential oil on the way, with the result that picking nosegays for your beloved may leave you covered for weeks with agonizing sores.)

Saving the physical presence was only half the battle. The question remained, how to preserve the spiritual essence of the place, the sense of the pristine, the primitive, the lawless, the wild? With a million cars carrying curious sightseers up and down the highway each year, it was impossible to prevent a transformation of Big Sur society. Where once the independent cuss was the norm, now a

Suspended in fog, a cabin hangs from a cliff at Esalen. Healing arts specialists, including the movement therapist (above, working from her home), are drawn to the institute.



An Edenic destination for affluent vacationers, the Post Ranch Inn offers its Basking Pool, complete with stunning Pacific seascape.

good 75 percent of the population (which varies with the seasons between 1,500 and 2,000; the coastal Indians are said to have numbered 1,200 at their peak) is dependent on the tourist trade, or hospitality industry as it is now called—cooks, waiters, bartenders, chambermaids, clerks in gift shops and art galleries, designers, photographers, park rangers. With the acute shortage of housing and with rents at Manhattan levels, some of them have to commute 50 miles and more to their work.

And to keep up with the times, this community is wired. Many people who used to own vacation homes, which they occupied for a few weeks and rented out the rest of the year, have discovered that computers allow them to conduct their business from their living rooms. They go to the city on occasion to sign contracts.

There are still some folks of the old school—no one knows exactly how many—who live more or less anonymously in ramshackle structures in the woods, on land they bought when it was worth about a hundredth of one percent of what it would bring today.

Orrin Winton, one of the hardy band of year-round unauthorized campers—he was the one who found in a trackless canyon the bones of a girl hiker who had been missing for three years, but he didn't notify anyone of his discovery for five months because he doesn't like his privacy to be intruded on—could until recently be seen occasionally plugging his laptop into the pay phone beside the post office. There, he accesses his Website, devoted to his family genealogy and to the subject of antenna design for amateur radio operators. He sees himself as a last stand against both the state authorities and the private enterprise system, which he feels are ganging up against the dropout.

The Forest Service will not authorize anyone to live in the woods for more than two weeks; restaurant owners will no longer leave their garbage where it can be picked over in dumpsters. Orrin Winton has, however, lived successfully alone in the wilderness, equipped with an all-weather plastic-coated tent, a pair of sleeping bags, a propane stove and a .22-caliber gun, for the past 7½ years.

The freezing out of the dropouts has made for a quieter, gentler and somewhat more conventional Big Sur. There is still dancing at Nepenthe, but only once a month. There are still artists and artisans in Big Sur, scores of them, but they no longer live in shacks without refrigerators or running water and peddle their wares to motorists on the highway. They have studios, some of them very elaborate studios, and they sell their works in galleries. You can view their works in venues as various as the boardrooms of Fortune 500 companies and the George Bush Presidential Library.

There is a certain nostalgia for the wild old days of 30 and 40 years ago, which began up in San Francisco, where visions of Henry Miller, the wild prophet of sex and anarchy, mingled in the minds of restless young people with the knowledge that there were no resident policemen down there, only a patrol car that drove through, going south early in the morning and back north in the evening. They came in all shapes and sizes: Beat poets like Jack Kerouac, folksingers, high school kids plotting revolution in Redwood City and Walnut

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It was a continuous celebration of drink, drugs, sex, Zen, liberty, folk music, rock music.

Grove, deadbeats and petty thieves of the type described at great length in a cult classic by Richard Brautigan called *A Confederate General from Big Sur*, all fleeing from the stifling standardized air of the commercial culture, all singing the anthem of Woody Guthrie, "This land belongs to you and me." They spread up the creeks and through the forests, uprooting the "No Trespassing" signs, chopping down trees for their campfires, bedding down under the stars in fields of poi-

Jeff Norman, a consulting biologist who is an expert on the Big Sur ecosystem, makes his home base a remote two-room cabin constructed in 1929.

son oak or in abandoned cars, in continuous celebration of drink, drugs, sex, Zen, liberty, folk music, rock music and everything else that came under the general heading of Love.

The older inhabitants were outraged by the noise and the strewing of garbage; Henry Miller referred to all those disciples of his as "locusts." But it was those unruly young people, not yet known as hippies, who would provide the publicity that would put Big Sur on the American map. In the long run, says one of the motel owners, they ended up being good for business.

A Dr. Henry C. Murphy in Salinas (he delivered the baby John Steinbeck) had purchased 165 acres of wooded cliff-top land a few miles south of the village of Big Sur, including some hot springs that had cured Indians and pioneers of arthritis. He built bathhouses there with the idea of creating a therapeutic spa.

From this point, fact erodes and legend proliferates. As one story goes, when Murphy heard that some young rowdies from San Francisco were coming down on moonlit nights for wild rompings, which were destroying his buildings and defacing the environment, he sent orders to the caretaker of his house nearby. Murphy instructed that fierce-looking young man from Missouri, who happened to be named Hunter S. Thompson, to get rid of them. Thompson armed himself with a shotgun, formed a posse, including folksinger Joan Baez and two Doberman pinschers, and went up one midnight through the solitary trail that led to the hot springs. "They were plenty loud up there," says one of the purveyors of local folklore, "but the Dobermans must have been louder, because when they got there, there was nobody left, and they've never been since, though how they got away without jumping 450 feet into the ocean nobody knows."

After this Night of the Dobermans, Dr. Murphy came down to express his satisfaction, and found the walls and ceilings of his home full of buckshot, and fired his caretaker.

In time, the property came into the hands of Dr. Murphy's grandson Michael and his Stanford classmate, Richard Price, both of them dissatisfied and disillusioned with the philosophies they had studied in the classrooms. They founded the Esalen Institute in 1962 to use the property around the hot springs to encourage alternative ways of understanding and experiencing the world.

Esalen, too, would enter the national consciousness as a symbol of highbrow counterculture. "A center for alternative education, a forum for transformational practices," it attracted people interested in radical change in their own lives, in their society, in the traditional thought patterns of the Western world. They came to meditate, to interact, to study the philosophies and practice the rites of Buddhists and shamans and medicine men and Jungian analysts. They came to hear Alan Watts proclaim that Western science was a sham, or to hear Timothy Leary summon them to "Turn On, Tune In and Drop Out."

Life was on the wild side in the early days. There were folk festivals

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where 3,000 people might show up to hear songs like "Ballad of the South Coast." There was the time when a zany guy named Zebo, who turned up regularly on such occasions, picked up Lily Tomlin as she was performing and jumped with her into the pool. An alert operative noticed she was wired to a mike and might be electrocuted. So he slammed all the circuit breakers and saved the day.

Today Esalen is a quiet, more reflective place, "a polished academy," as one of the survivors of the Henry Miller days puts it petulantly. Old-timers say that the turning point came in 1980 when, during the first premonitions of the crack-up of the Communist empire, Esalen brokered an exchange between American and Soviet scholars and lecturers. Among those on the Soviet side was a minor apparatchik named Boris Yeltsin. It was felt that some of the unbridled goings-on on the cliffs of Big Sur might give the visitors a wrong idea of America, and severe restrictions were imposed on public taking of controlled substances and on public nudity outside the hot baths.

Esalen presents the picture of an Ivy League campus, spread across an exceptionally attractive stretch of woodland overlooking the Pacific. Cheerfully earnest young students, with a smattering of graybeards, gravitate among workshops, study groups, seminars, meditative sessions, in such courses as "Awakening the Buddha Within," "Gestalt Process," "Golf . . . An Exploration of the Deeper Game," "Reichian Energetics," "Solving Life's Serious Issues" and "Applied Shamanism." Instead of a revolution, they are seeking self-help, expanded horizons, a widened awareness.

The hippies are long gone now, to die of overdoses or become associate professors in conventional colleges. The outcast figure who presaged their experimentation can be found in Jack Kerouac's *Big Sur,* with its remorselessly detailed account of how the King of the Beats came back to Big Sur to recover from the disillusionments of drunken middle age by reconnecting with the wilderness, and how he tried to resume the cheerful wild life of old, but sweet port wine dragged him down to self-loathing and despair and delirium tremens.

Big Sur continues to lure people with itching feet. They come from the ends of the earth.

The gentrified quiet of Big Sur today no doubt would repel Kerouac. It continues to lure people with itching feet. They come from the ends of the earth, from backwoods or city, from northern Mexico or northern Idaho, and just as on the day when Jeffers took his first ride here in 1914, they all have their story to tell.

Strolling down Highway 1 between the library and the post office, you might run into "Tassi" Bob Robinson, once the youngest officer ever to command a ship in the Royal Australian Navy, who chanced to take a trip down to Big Sur one day when his ship was visiting San Francisco Harbor. He discovered a climate much like that of his native Tasmania but with a somewhat more lively social scene. He now runs a tourist compound that happens to boast the liveliest bar in the village.

Or it might be Magnus Toren, a Stockholm boy who, after seven years of fetching and delivering yachts in the South Seas, drifted somehow to Big Sur, married a flower child from Kansas and now directs the Henry Miller Library, where pilgrims come from all the continents.

Or it might be Jeff Norman, who lives so far up on a ridge it may take him an hour on foot and an hour by four-wheel drive to get down to the village in good weather. A college dropout who came here 29 years ago and learned how to live in the wilderness, Norman went on to study by candlelight and is now a consulting biologist employed by government and private agencies in Big Sur to measure and regulate the environmental impact of any new construction. He is also widely acknowledged as an expert on local history.

Or it might be a young woman from Appalachia, who was three times throttled by her father to the point of coma, but went on to become a junior executive at a major corporation. She has now come to Esalen to learn if there isn't something more important in life than building better computers.

It is a quiet, prosperous, laid-back place. But there remains that touch of uncertainty, of distant danger in the air. Any heavy rain, and the rain can be heavy, sets people to asking if it will provoke one of those giant mudslides or rockslides that every ten years or so drag parts of Highway 1 into the ocean, cutting off the whole community from the rest of California for weeks or even months at a time. And a low rumble from the west is a reminder that frothing waves are biting away 8,000 times a day at the cliffs on which the pleasure domes of Big Sur stand, while silently beneath it all *el país grande del sur* continues its fingernail-paced slide toward doom.

Robert Wernick is based in Paris; Catherine Karnow travels the world on assignment from her home in San Francisco. They are both hooked on Big Sur.

Vertiginous green hills plunging to the sea remain the dramatic, defining elements of a rugged landscape that has drawn wanderers here since time beyond history.

From the top left by row: XR™400R, Accord EX V-6 Sedan, portable generator, Honda Harmony™ lawnmower, BF130 outboard, FourTrax® Foreman® ES, Acura NSX, string trimmer, snowblower, Gold Wing® SE, Honda Masters™ lawn tractor. ©1999 American Honda Motor Co., Inc. www.honda.com

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Going Toe to Toe with Shoes

BY ALYSE FRAMPTON

AT TORONTO'S BATA SHOE MUSEUM, FOOTWEAR OPENS A WINDOW ON THE LIVES AND LORE OF PEOPLES THROUGHOUT THE AGES

PHOTOGRAPHS BY BROOKS WALKER

Footnotes—*Outer row, from left:* Embroidered silk shoe (c. 1860) from China for bound "lotus" foot; black lacquer wooden clog with tatami insole from 19th-century Japan; elevated traditional Korean clog; knee-high boot worn by Tibetan lamas and noblemen; Inuit sealskin kamik; 19th-century Middle Eastern woman's stilt sandal; man's shoe with upturned toe from Iraq; Senegalese leather mule; concave rawhide sandal (c. 1900) from Uganda; painted wood and leather Bolivian sandal. *Inner row, from bottom left:* Handmade wingtip brown oxford (1995); shoe with fanciful elongated tip made for upperclass men in India; pom-pommed mules worn by Pakistani women for traversing sand dunes; contemporary catfish-skin shoe from Iceland; Zairian royal sandal with carved toe knob; elegant black suede pump by famed Italian designer Salvatore Ferragamo.

CLAD IN A DESIGNER SUIT AND A SOFT SILK SCARF, SONJA BATA LOOKS LIKE she shops in the exclusive boutiques of Toronto's Bloor Street, not on an icebound island in the Canadian Arctic or in the dusty market towns of mountainous Tibet. But Bata, businesswoman, philanthropist and founder of North America's largest and most comprehensive shoe museum, will go just about anywhere to get the right shoe.

In 1992, she traveled by chartered plane to the Arctic community of Grise Fiord on Ellesmere Island, one of the most remote, punishing places on earth. "I'd heard of an elderly Inuit woman there who was known for making bearded sealskin boots, or 'kamiks,' the traditional way," says Bata. "I was told that she even used sinew for the stitching. Nowadays many women use dental floss. Of course I wanted to commission a pair for our collection."

Bata found the old woman without difficulty. "She was very wrinkled, with bright-black eyes," Bata recalls. "And she kept completely silent while her daughter translated my proposal. She looked so serious I was sure that she would turn me down. Then all at once she started to roar with laughter. Her daughter joined in, and I did, too. Finally the old lady wiped her eyes and spoke, pointing to her mouth. The daughter translated: 'My mother says that chewing the sealskin is very hard. Therefore her price to make the boots is a new set of teeth!'"

That unusual bargain, though apparently made in jest, is just one of many that Bata, a collector of footwear both ordinary and extraordinaire, has struck during more than 50 years of far-flung forays aimed at amassing the superb collection now housed in the Toronto museum that bears her name. Opened in May 1995, the Bata Shoe Museum celebrates footwear and shoemaking not as a footnote to fashion but as a window on human history. Its collection includes such treasures as woven funerary shoes from a royal tomb in ancient Thebes, 15th-century German foot armor, Queen Victoria's mourning boots and a rare pair of Inuit boots made of eider skin. Also featuring such crowd-pleasers as Picasso's zebra-striped boot and Madonna's hot-pink platform pumps, the museum has gained international attention for its provocative, sometimes irreverent treatment of an offbeat subject.

Explaining how she came to acquire more than 10,000 shoes and related artifacts that span 5,000 years and represent every continent on the globe, Bata says simply, "I married a shoe man." Her husband is the international shoe manufacturer and retailer Thomas Bata. The Batas, for generations the village cobblers of Zlin, Czechoslovakia, had made their fortune by mechanizing their

country's shoe industry, ultimately developing the firm into a world supplier of footwear. In 1939, as the Nazis advanced across Europe, Thomas Bata relocated the company to Canada.

When the couple wed in 1946, Sonja was studying architecture in her native Switzerland. It wasn't long, however, before she became involved in helping her husband rebuild the family business. On visits to company plants around the world, she applied her interest in design to product development and to adapting traditional footwear for mass production.

Realizing that local styles were losing ground to Western ones, Bata began gathering shoes to preserve the technological and cultural heritage they represented. When the collection overflowed the archives of the Bata company's Toronto headquarters, she decided to create a museum that would do justice to the collection and enrich the city.

Designed by Canadian architect Raymond Moriyama, the five-story, $12 million museum is a striking structure often likened to a shoe box with its lid ajar. Entering the building through a two-story-high transparent wedge, visitors find themselves in an airy atrium. A graceful staircase with a glass balustrade sweeps from the basement to the fourth floor, and light pours in through a tall window that soars the entire height of the building's south wall.

This morning the museum's founder is ensconced behind a shoe-shaped reception desk, greeting visitors and directing traffic. "Footwear tells the whole human story," she says in a rare quiet moment. "It's all there, from the animal hides that prehistoric cave dwellers wrapped around their feet to the high-tech boots worn by astronauts." Surveying an incoming group with pleasure, she adds, "I know people arrive thinking 'What kind of wacky place is this, a footwear hall of fame?'" Then she breaks into a wide grin. "They leave saying shoes are more interesting than they ever dreamed possible. That's my mission."

At the entrance to the museum's main exhibition, "All About Shoes," is a plaster cast of the oldest known hominid footprints on earth, dating back 3.6 million years. The originals were discovered by the anthropologist Mary Leakey in Tanzania in 1978. Easily mistaken for any seen on a beach today, the prints aptly set the stage for an exhibition about footwear through the ages—its myriad guises, exotic uses and ancient past.

Prehistoric footwear scarcely appears in the archaeological record. The first crude foot wrappings were likely intended as protection from harsh terrain and cold weather, and were probably improvised from bark and other plant materials. It's possible that the sharp flint tools found in late Stone Age sites some half-million years old were used to prepare animal skins as coverings for the body and feet. But leather decomposes quickly, and until recently the most direct evidence of such apparel were drawings made by cave dwellers in the Pyrenees some 15,000 years ago. Two recent discoveries, however, have added many more details.

In 1991, hikers crossing a glacier in the Italian Alps happened upon the protruding head of what turned out to be the virtually intact body and clothes of a 5,300-year-old hunter now known as the "Iceman." The find gave scientists a firsthand look at late Stone Age attire. Complementing a finely designed coat of animal skins and fur, the man's ingenious leather shoes had an upper flap sewn onto a bottom sole, with a socklike net liner and laces made of grass rope. He evidently stuffed the net with grass for insulation, wriggled his foot into it and tightened the laces, molding the grass around his foot to prevent it from slipping.

It was dry conditions, rather than glacial ice, that preserved a trove of slip-ons and padded sandals left behind by generations of prehistoric Native Americans who once took shelter in a Missouri cave. The fragile grouping, skillfully crafted of woven plant fibers, was unearthed four decades ago, but it was not until 1997 that surprised scientists were able to determine that several of the shoes dated back 5,000 years or more. The oldest, an 8,300-year-old thick-soled sandal with decorative braided cords that crisscross the foot, would look right in step today on Miami's South Beach or France's Côte d'Azur.

Shoemaking is one of the oldest crafts in the world. In virtually every early civilization skilled craftsmen plied their trade using handtools and techniques that were to remain essentially unchanged for thousands of years. The sandalmakers depicted in wall paintings found in the tombs of Egyptian

Artful Soles—*Insets, counterclockwise from far left:* Surrealistic molded red-leather shoe was created by Rolando Segalin in 1994 ; wedge-heel, 1940s red sling-back was designed by Ferragamo; early 1600s Venetian chopine featured a high platform covered in velvet; wooden clog with iron spikes was used in 19th-century France to crush chestnuts; 1960s "Flower Power" sandal is by Beth Levine.

pharaohs, for instance, could easily have shared the workbench on which their itinerant Colonial American counterparts made stout farm boots five millennia later.

Over the centuries, shoes have undergone countless changes in style, form and function. These changes speak volumes about the lives of the people who wore them and the societies in which they lived. Shoes were used not only for work, sport and play or to make a fashion statement, but also to mark special occasions, display status and even express religious beliefs. In ancient Egypt, Greece and Rome, shoes were an established symbol of rank and worn mainly by the rich and powerful. "How beautiful are thy feet with shoes, O prince's daughter!" reads a passage from the Bible's *Song of Solomon*. In the Yoruba culture of Nigeria, royal status was indicated by the quantity of beads and patterns on boots. In America, the Iroquois made plaited corn-husk slippers to be worn by the dead in funerary rituals. At the height of the Victorian period, genteel women were expected to wear sweeping skirts and crinolines to hide their feet, which modesty demanded be confined in ankle-high boots lest a glimpse of uncovered skin be revealed.

In the early 14th century, shoes with comically long pointed toes were all the rage. Although it seems more appropriate to a court jester than a gentleman, this fashionable men's style was no joking matter and ultimately forced King Edward IV of England to put his foot down. In 1463 an edict was issued decreeing a 6-inch toe for commoners, a 12-inch toe for gentlemen and a 24-inch toe for nobility. According to some sources, the elongated points of nobles' shoes were sometimes attached to a chain worn at the shin to keep the titled wearer from tripping over them. The style endured for two centuries, despite the church's disapproval of the shoes' suggestive shape.

Another British monarch, it is believed, was responsible for establishing the standardized foot measure. In 1320, Edward II decreed that the measurement should equal a row of 36 barleycorns—the actual length of his own foot. Each barleycorn was one third of an inch, which added up to 12 inches or one "foot."

For most of history, fashionable footwear was the preserve of the well-to-do. Everyone else thought themselves lucky to own a single sturdy pair of work shoes; the poorest people often went barefoot, as many still do in some parts of the world. All that changed when a host of principally American inventions mechanized shoemaking in the 19th century, displacing handwrought shoes with cheaper, factory-made products. Suddenly even those of modest means could own a small footwear wardrobe.

The shoes of our time often hark back to earlier eras in surprising ways, yet tread new ground. The outlandish platform shoes used on stage by rock stars such as David Bowie and Madonna recall shoes worn in Greek theater of the fifth century B.C. Wanting the tragic heroes in his plays to loom larger than life, the dramatist Aeschylus required that his actors all don shoes with thick cork soles. No longer defined

Following in Their Footsteps—*Insets, counterclockwise from top left:* Bata shoe's prototype for an Army boot with a sole that left the impression of a Vietcong sandal; designer Roger Vivier's innovative 1963 "comma" heel, bejeweled pink pump; shoe of emu feathers and human hair worn by Australian aboriginal executioners to mask their footprints; Pablo Picasso's imitation zebra-skin boot.

Regal Feats—*Clockwise from lower left:* Gold-sequined 1800s Burmese royal slipper bears an image of the mythical bird Hintha; Japanese lacquered papier-mâché boot (1928); Ghanaian leather sandal is from an Ashanti royal family; elaborately beaded Nigerian boot denotes the high status of a Yoruba king; curl-toed gold-embroidered slipper (1790-1820) was made for an Indian ruler.

by the narrow tastes of a ruling elite, today's footwear fashions are driven by popular and street culture. The 1973 film *American Graffiti* sparked a short-lived revival of saddle shoes, the de rigueur high school fashion of the 1950s. Punk subculture in the 1970s and '80s transformed the Doc Martens work boot into a hot fashion item. Meanwhile, handcrafted shoes have come full circle and are now, as they were in ancient times, a luxury reserved for royalty and their ilk. Prince Charles is shod by the British bespoke shoemaker John Lobb, while Arab oil princesses are kept in handmade shoes by craftsmen such as Rolando Segalin of Venice.

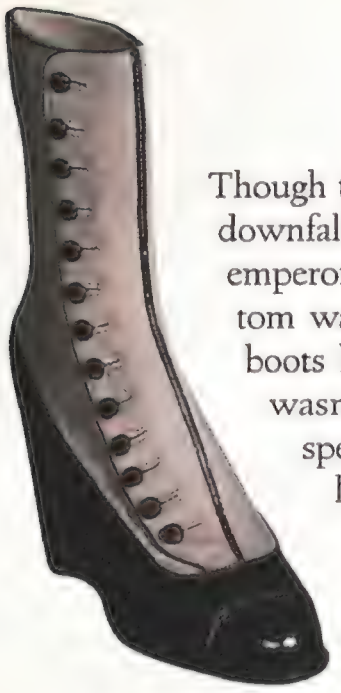
The Bata Shoe Museum explores all these themes with a deliberately playful touch, says the museum's former curator, Jonathan Walford. Genial and bearish in his rumpled corduroy jacket, Walford worked with Sonja Bata for 11 years before leaving the museum to launch his own consulting business. A charming guide to the collection, he takes the inherent humor in his occupation very seriously. "Did you ever watch the sitcom *Boston Common*, which aired a few seasons back?" he asks. "The resident nerd was a character who worked as a researcher in Early American footwear. He's forever spouting shoe esoterica, most of it complete drivel. It seems to be part of our culture that footwear is seen as necessary but somehow frivolous. That paradox is what the museum plays on."

This particular afternoon the actor David Carradine is about to formally present the museum with the shoes he wore in a scene from the television series *Kung Fu*. A small crowd, dominated by the mostly female members of Carradine's Toronto fan club, claps mightily at the arrival of the star, dressed for the occasion in black tails and scuffed white sneakers. His gift is a pair of pale beige Capezio dancing shoes, specially fitted with nonslip soles. "Dancers like to slide; martial artists don't," he explains, demonstrating a high kick that nearly grazes a curator's nose.

"They tell me that of all the people whose shoes are in this museum, I'm one of the few who actually showed up to donate them in person," he quips; "but I guess it was hard to get a commitment from Elvis or Napoleon."

Elvis, it turns out, is represented by a pair of blue-and-white "wet-look" patent loafers (p. 121), but the museum owns no shoes or boots worn by Napoleon. It does, however, possess a pair of the French emperor's black silk socks, saved after his death on St. Helena. Walford points to a minute pile of dirt displayed alongside the socks. It is the leavings from the wash water when the socks were conserved. "That dirt is famous among Napoleon buffs," he says wryly. "Several conspiracy theorists have asked to analyze it for traces of arsenic."

The display will soon be enriched by a recent acquisition—an original order for new boots penned by Napoleon's arch foe, the duke of Wellington, shortly before the two men faced each other at the Battle of Waterloo.



Though that confrontation marked Napoleon's downfall, when it came to shoes the French emperor obviously took no chances. His custom was to have servants break in his new boots before he wore them. And Napoleon wasn't the first French ruler to demand special treatment for his footwear. Before losing her head to the guillotine in 1793, Marie Antoinette employed a servant whose sole duty was looking after the monarch's 500 pairs of shoes.

Although the notorious 3,000-pair collection that Imelda Marcos accumulated as first lady of the Philippines may not be the largest in the world, it probably comes close. That collection became the property of the Philippine government, but after Marcos left the country, the museum acquired a pair of elegant black satin evening sandals once owned by the former shoe queen.

A rich and varied educational program accompanies the museum's exhibitions, covering topics that range from shoe and foot fetishism to the role of shoe prints in crime detection. Recently, museum staff did a presentation about shoes and horticulture. Among the items shown were Dutch wooden clogs with flat bottoms to tamp the earth for tulip planting, and from Japan, a three-foot-high stilted platform shoe worn to pick mandarin oranges.

One group of sixth-graders has come here as part of a social studies project on the 1960s, explains their escort, museum docent Robert Barron. The children gather around the display "What's My Line?" which shows how unusual occupations have given rise to singular shoe styles. A prototype boot that the Bata shoe company developed at the request of the U.S. Army during the Vietnam War is an instant hit. Produced at a company factory in Maryland, it features a molded sole that leaves the imprint of a Vietcong sandal, camouflaging the American soldier's tracks.

The '60s momentarily forgotten, a boy gapes at an object bristling with nine-inch-long serrated iron spikes. Not an instrument of torture, the wooden clog was used to crush chestnuts in 19th-century France to extract tannin for use in the leather industry. In contrast, a man's colorful sandal from Bolivia looks harmless enough, its true purpose artfully concealed. Equipped with metal toe tips and hobnailed soles, it is in fact a lethal weapon designed to be worn in duels. Not included in the exhibition, but equally intriguing, says Walford, is an Australian shoe of human hair and emu feathers once worn by an aboriginal executioner. In traditional aboriginal society, people went barefoot. Executioners apparently wore such ritual footwear to disguise their footprints and protect their anonymity.

"What about hippie shoes?" asks a pigtailed girl as Barron leads his charges to an installation entitled "The Height of Fashion"—a wide spiral staircase with the creations of famous footwear designers adorning every step. The children stare at a pair of "Flower Power" sandals created in the late '60s by American designer Beth Levine. With soles lined with bright-green synthetic grass and a yellow chrysanthemum toe strap, the sandals look like they stepped right out of an Andy Warhol painting. As the class troops off to its next stop, a display of '60s-era disco boots, complete with music, Walford points out the work of two designers who made fashion history on foot. Salvatore Ferragamo, inventor of the wedge heel, is represented by a bright-red sling-back with an upturned black-and-gold kid toe from the mid 1940s. The whimsical comma-shaped heel on a bejeweled pink silk pump from 1963 is the work of Roger Vivier, once a leading designer for the House of Dior in Paris.

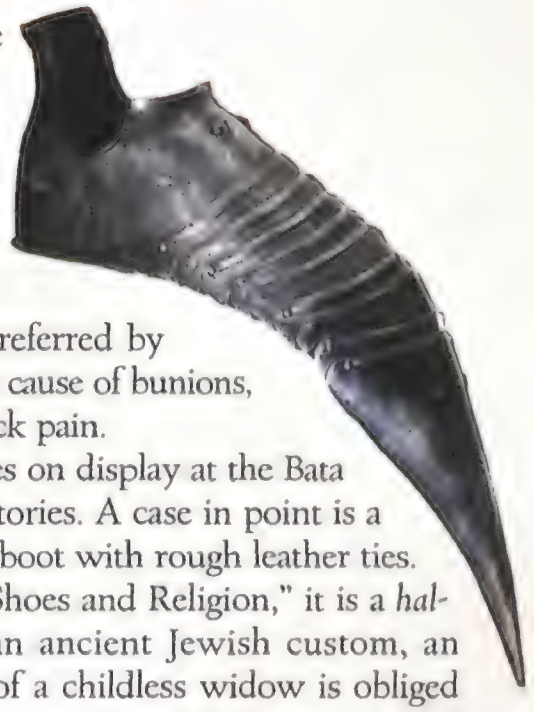
Continuing his running commentary, Walford paraphrases Brillat-Savarin's famous gastronomical maxim, proclaiming, "Show me your shoes and I'll tell you who you are." The red high heel is the tip-off for an aristocrat's shoe from late 17th-century France; it tells us that the shoe was worn only at the court of Louis XIV. The term "well-heeled," in fact, originated from the upper-class fashion of high-heeled footwear. The elite of late Renaissance Europe favored costumes that made them look more imposing. Elevated shoes

If the Shoe Fits—*Insets, counterclockwise from top left:* A buttonhook was needed to don this popular side-buttoning turn-of-the-century boot; shoes like this square-toed, embroidered mule were popular with both men and women in the 17th century; a well-used blue-and-white 1970s patent loafer belonged to rock idol Elvis Presley; the extraordinary steel *sabaton* was part of a 15th-century suit of armor.

Sacred Soles—*Clockwise from lower left:* Brown leather *halizah* shoe, c. 1900; Apache shaman's beaded deerskin boot; black lacquered wooden clog used by Japanese Buddhist monks; silver boot of a youth sacrificed in a Peruvian ritual 500 years ago; sub-Saharan Muslim sandal; gold-embroidered shoe of Pope Pius IX; foot-shaped *paduka* worn by Buddhist and Hindu holy men.

gave them a literal leg up on their social inferiors while protecting their feet from the muck of the street. The high heel, which came into vogue around 1600 and was worn by both men and women, had evolved from the chopine, an earlier platform style that had been popular in the East for centuries and arrived in Europe through trade between Turkey and Venice. Adopted by wealthy Venetians, the style in its most exaggerated form made the wearer, who often needed the assistance of two servants to stay on balance, appear as much as two feet taller. The elite scorned the fashion as it filtered down to the lesser classes. Last to wear the chopine were the street prostitutes of Venice, who wanted to stand head and shoulders above the competition.

An exquisitely embroidered silk slipper displayed nearby represents an extreme example of foot mutilation perpetrated in the name of beauty. Measuring just three to five inches in length, such slippers once covered a woman's foot crippled by the Chinese custom of foot binding. Initiated in the royal courts of the tenth century, the painful procedure was finally banned in 1911. The resulting "lotus" feet, as they were called, looked like tiny hooves and almost immobilized a woman. A symbol of high status, they were also considered powerfully erotic. Of course, the practice of deforming the foot in the name of beauty is still very much with us. A recent survey found that about 45 percent of American women wear shoes that are too small, and the pointy-toed high-heeled pumps preferred by many women are a frequent cause of bunions, strained leg muscles and back pain.



Some of the plainest shoes on display at the Bata have the most dramatic histories. A case in point is a drab, crudely made brown boot with rough leather ties. Part of a grouping called "Shoes and Religion," it is a *halizah* shoe. According to an ancient Jewish custom, an unmarried brother-in-law of a childless widow is obliged to marry her. In the *halizah* ritual, by publicly untying and removing his shoe, she can release him from this duty. Also compelling is an ivory sandal from India that belonged to a follower of the Jain religion, a main tenet of which is the preservation of all life. Designed to make minimal contact with the ground, its sole rests on a thin-sided hollow platform about two inches high, helping its wearer to avoid crushing insects underfoot.

Nearby are a pair of cowboy boots donated to the museum by the actor Robert Redford. Fittingly, Redford's boots owe more to the Hollywood film industry than the Old West. Their dandyish stacked heel, pointed toe and decorative punchwork and stitchery were inspired by the Spanish tradition of fancy equestrian leathergear. A boot with a tapered toe slid easily into the stirrup, and the raised heel helped it stay there. The style made its way from Spain to Mexico and from there to the United States, where it was popularized by Tom Mix westerns during the 1920s. As for the real cowboys, they rode the range in boots of the type worn by Civil War soldiers, with a low heel, loose-fitting shaft and square toe.

A sleek red-and-black running shoe worn by track-and-field gold medalist Donovan Bailey at the Atlanta Olympic Games in 1996 exudes its own cachet. Through highly paid product endorsements, celebrity athletes like Bailey and Michael Jordan helped push the mania for designer athlet-

Walking Tall—One of the Bata's most popular attractions, Elton John's Italian-made, c. 1970s rhinestone-studded platforms made it hard for him to play the piano but added five inches to his height.

ic shoes that gripped North America in the 1970s and reached tsunami-like proportions over the next decades.

"At the height of the boom, pretty well every grade-school kid and teenager, not to mention their parents, were victims of 'sneaker snobbery,'" says Walford. "If you didn't have the model with the latest color scheme or the flashing lights or the gel-padded soles, you were toast." Few of these aggressively marketed features improved much on the original sneaker—a flexible, rubber-soled cotton-canvas shoe with laces that was created in England in the 1860s for the newly fashionable sport of croquet.

"Now we look back at the sheer silliness of some of the styles and laugh, but the craze has left its mark," Walford says. "Because they're so comfortable and affordable, sneakers have become casual streetwear for everyone." Nor is this fashion a spent force. Ironically, the trend in North America is back to basic, simple styles that look rather like the original croquet shoe.

An installation called "Star Turns" is the museum's biggest crowd-pleaser. A glitzy array of celebrity footwear is displayed on a stage under a flashing marquee; behind it, a screen shows vintage newsreel and film footage about the shoes' original owners. Here a pair of low-heeled black pumps worn by Indian prime minister Indira Gandhi share the spotlight with Marilyn Monroe's saucy red stilettos. Here, too, are Elton John's outrageous rhinestone-studded platforms. "Elton said they were too dull for stage wear, claiming he only wore them shopping," Walford grins. "But we have a photograph of a 1974 concert that shows the shoes right there on his feet." The only item that rivals Elton's platforms in popularity, it seems, is a fuchsia pump made c. 1985 for Diana, Princess of Wales.

"All About Shoes" is complemented by exhibitions in three smaller galleries with more specialized themes. The bearded sealskin kamiks that drew Sonja Bata to Ellesmere Island were destined to enrich the Indigenous Gallery, a showcase for the museum's remarkable collection of some 500 traditional handmade boots gathered from across the Arctic Circle. Essential to survival in a harsh environment, the boots have been made using traditional styles, materials and techniques, many never previously documented.

A magnificent feathered boot represents one group's response to the dwindling seal herd in their locality. Deprived of hides, the women fashioned boots from virtually intact eider-duck skins. "Even the Inuit who've seen the boots we have here are amazed," says Walford.

Changes are afoot as the Bata Shoe Museum plans for the future. A new director, Sharon McDonald, has joined the staff. McDonald, formerly the head of the Metropolitan Toronto Police Museum, jokes, "I used to work with gumshoes, so I fit right in." The museum's first director, Edward Maeder, a former chief curator at the Los Angeles County Museum of Art, has moved on to other projects but still serves the Bata as a consultant.

Although the museum will continue to collect shoes and related objects from around the world, Sonja Bata's aim is to make it a center of footwear scholarship, with an emphasis on Native American and circumpolar footwear. "Our fieldwork yields insights into indigenous cultures that are not widely known," says Bata. "Preserving footwear helps enlarge our knowledge of a disappearing way of life."

The museum's newest exhibition, "Paduka: Feet and Footwear in the Indian Tradition," opened in September. For Sonja Bata, the show has special meaning. It was during her early travels in India and Pakistan as the young wife of a shoe magnate that her fascination with traditional footwear took root. "In those days I collected intriguing shoes right off people's feet," she laughs. "I would trade a brand-new pair from our factory in exchange." Some of her first acquisitions were proudly displayed in her Toronto home. "Other people put porcelain bowls and such on their shelves," Bata recalls. "Mine were filled with Indian *padukas*—ivory-and-silver platform sandals with superbly shaped knobs that fit between the wearer's toes. To my eye, nothing could be more beautiful." For a second, the footwear museum founder sounds faintly abashed. "I'm afraid I just get carried away with shoes."

Canadian journalist Alyse Frampton wrote this article barefoot. Photographer Brooks Walker loves his Rolando Segalin loafers.

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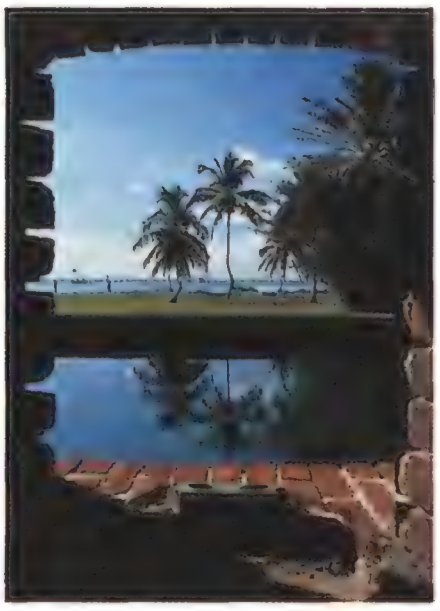
A Jewel in the Dry Tortugas

BARREN, BIRDY AND BEAUTIFUL, FLORIDA'S REMOTE FORT JEFFERSON HAS TALES, TERNS AND NOT MUCH FRESH WATER



BY JAMES CONAWAY

PHOTOGRAPHS BY REGIS LEFEBURE

Hammered by time, not shot and shell, Fort Jefferson (opposite) shelters prickly pear cactus and palms instead of cannoneers. Its harbor light (above, center) still welcomes visitors to the Dry Tortugas.

WE ARE SITTING IN A 25-FOOT BOSTON Whaler about 70 miles west of Key West, in limpid water through which turtles wing, and we are talking portable potties. Not their efficiency, their drawbacks. "Holding tanks in boats will soon be de rigueur," says Paul Taylor, a ranger here at Dry Tortugas National Park. "No harbor's going to let you in without one."

His plastic web belt supports handcuffs, a steel club that collapses like a telescope and a .40-caliber automatic pistol that looks out of place in the tropical sun. A young woman in a swimsuit aboard the sailing catamaran *Mister Toad's Wild Ride* has just been told that she can't dump her seven-gallon portable toilet into the harbor.

"Well," she argues, "we can dump it at the dock rest room."

"No, you can't," says Taylor, polite but firm. "It's already overloaded." He doesn't tell her that the park's septic system has to be pumped out about three times a year, at $8,000 a pop, because a barge must be dispatched from Key West to carry the sewage away—just one of the huge logistical problems in administering this remote watery stronghold. "You've got to go outside park boundaries."

Basically that means sailing to infini-

ty to flush the toilet. *Mister Toad's Wild Ride* is advised to wait a bit, however, since a black squall line has just been drawn across the northern horizon by a cosmic grease pencil. The Dry Tortugas are known for many things, including intense storms that have littered the bottom of the park's 100 square miles with more than 200 shipwrecks and driven waves into the moat around Fort Jefferson, the massive, moldering brick hulk behind us—the last of a chain of coastal fortifications envisioned by the founding fathers of the United States to protect a young nation from European hegemony. The bastions and the then state-of-the-art gun ports never saw military action, and now its crumbling ramparts overlook one of America's most beautiful wild remnants.

"IT'S ONLY WATER"

THE SEVEN LITTLE KEYS MAKING UP the Dry Tortugas provide nesting grounds for thousands of sooty terns and brown noddies, for loggerhead and Atlantic green turtles, as well as stopovers for migratory birds on their way to and from the Eastern United States, and more than 70,000 human visitors annually. Taylor is the only law enforcement officer on duty today, which means that a hundred square miles of water hereabouts contains only one of him and an unreckonable number of boaters and tourists, as well as the odd drug smuggler, poacher and treasure thief.

Lots of felony warrants out there, as Taylor puts it. When he apprehends a criminal, he has to wait for transport to come out and take the person away. Rangers try to exhaust other methods before arresting people. Many citations involve illegal fishing. "Most commercial fishermen are honest," he says, "but if the temptation is too great, they may fall on the wrong side of the law."

The temptations are lobsters twice the size of those found elsewhere in the Florida Keys, and abundant fish. "Poaching is mostly done by sniping at park boundaries. It's inversely proportionate to our effort." But the radar and the Global Positioning System (GPS) are presently down, so night patrols have been suspended.

And then there are the rowdy fishermen. "I tell them not to anchor too close. When they decide to take a day off and come to the park, it can be a disaster. They get drunk and fight. Sometimes there's a woman on board, and then you get soap opera scenarios. It's a little lonely," he adds, "boarding a shrimp boat by yourself when they're brawling."

Taylor has keen eyes behind rose-tinted sunglasses and a beard that gives him a slightly piratical air, despite his institutional green shorts. The combination bullet-proof vest and life jacket is designed for action; a billed cap covers a head shaved to lapidary smoothness, and in his pocket he carries a notebook for recording the names of the watercraft in the harbor. "It can save hours of search time if a lost vessel can be put here on a particular day."

A group of men approach in a dinghy from their motor cruiser, not with a potty problem but a potential fishing problem. Taylor explains that they all need licenses and describes the species limits. "No lobstering," he adds, "and no spearfishing."

"No problem," says the skipper. "We're headed for Yucatán."

We're headed for Loggerhead Key, a few miles distant, but the dark line on the northern horizon has gotten thicker. "It's only water," says Taylor, of the rain that is surely coming. But a few minutes later he cuts the engine. A mass of gray clouds is moving fast ahead of the storm, toward us, performing high arabesques while the wind worries a suddenly bruised ocean. "I think we're going to get a genuine Tortugas squall," he says.

The first time I saw the Dry Tortugas was from a floatplane coming in low over lime-green water as calm and clear as the air around me. Grass in the fort's hexagonal parade ground shone like a rough-cut emerald set in a cobalt sea. Terns swarmed nearby, and angular frigate birds hung motionless above this most remote outlyer of the United States Park Service in the lower forty-eight. It was one of the best kept secrets in the system, sitting for centuries at the edge of European and American consciousness, isolation and sunlight the only constants, its history part South Seas idyll, part horror story.

I've returned a couple of years later aboard the 100-foot *Yankee Freedom*, in the company of 40-odd members of

Clockwise, from upper left: Rusting iron shutters have damaged bricks and masonry around the fort's gun embrasures; Bush and Long Keys stretch away to the upper right from Fort Jefferson; Park Service masons repair the arch of the fort's main entrance.

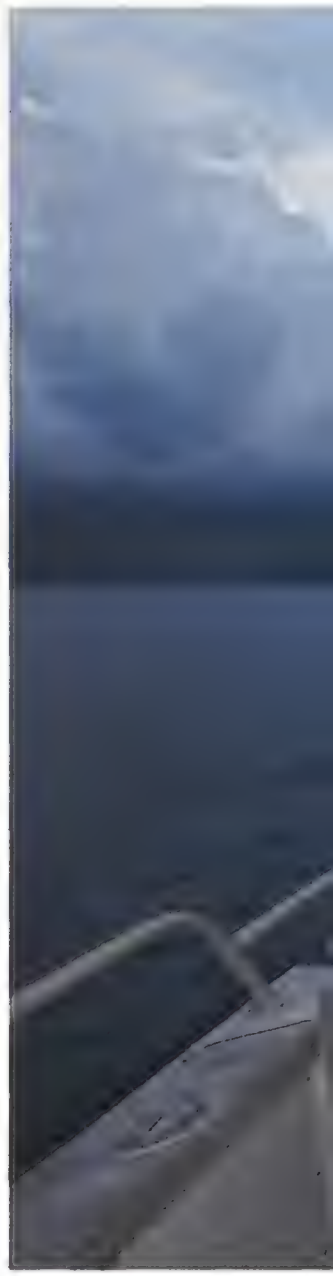
the Tropical Audubon Society. The Florida Keys National Marine Sanctuary launched an initiative, called Tortugas 2000, to establish a marine ecological reserve, and suddenly everyone—tourists, fishermen, salvagers, concession operators, scientists, bureaucrats, even bird-watchers—wants a piece of the Dry Tortugas.

I sleep fitfully on deck during the midnight passage and awaken menaced by the shadowed openings of gun ports. The bird-watchers are off searching for American redstarts and myriad other warblers, and hoping for a glimpse of the elusive red-footed booby, while I go to meet the maintenance supervisor, Mark Foster, who waits just inside the fort's portal, with its eight-foot-thick walls and arched ceiling. A fair-haired mechanic in white T-shirt and sneakers, Foster looks more like a tourist than a government employee. This is his day off, but in the Dry Tortugas that often means reporting for duty in your civvies. "We're on eight consecutive ten-hour days and off six," he says. "If I stay here instead of going to Key West, I work."

He is also one of the park's two managers, the result of a personnel shake-up ordained by the superintendent up in Everglades National Park, which administers the Dry Tortugas. The staff now numbers ten, not including a seasonal turtle researcher. Authority is presently divided between Foster and Paul Taylor; both of them already had their hands full. "I have four generators to think about, and three more on Loggerhead Key," Foster tells me. "We make drinking water by reverse osmosis, and those machines run about ten hours a day—I don't have a lot of margin."

Now he has to worry about visitors, too, and he has always had to arrange for provisioning the fort. The supply boat, the *Activa*, travels to Key West and back once a week but isn't always functioning. "It's terribly expensive to get anything out here. The fuel costs 75 cents a gallon to buy and $1.25 to transport. And we use 35,000 gallons a year." He pauses to let the figure sink in. "We can't store anything because our quarters are too small. And they leak. When it rains, the mortar drops into your food and everything else."

He calls it "fallout." It seems paradoxical to me: the largest all-masonry



fortification on the continent, with no place for extra cartons of tuna fish and canned peaches; people living in old gun casemates (as the gun rooms are called) resistant to cannonballs but not to the weather; a maintenance supervisor and a policeman dealing with administrative problems in a showpiece of 19th-century military architecture that is slowly falling down into a moat.

The fort contains more than 16 million bricks, another figure to conjure with. Foster takes me for a walk on the moat wall, to see parts of the fort's facade where whole sections of brick have fallen away. Congress has appropriated $250,000, and a challenge grant with the potential to provide about $2 million has been awarded to stabilize the masonry. This means removing the iron gun shutters, known as Totten shutters in honor of Brig. Gen. Joseph G. Totten, who designed them to protect cannoneers from incoming fire. Over the years the metal has corroded and expanded, displacing the masonry as effectively as artillery could have. "It's a massive undertaking," Foster says. "Floating scaffolding has to be set up, and masons brought from Park Service preservation centers. Each of the masons needs two tenders to help him." And these temporary residents have to be housed and their equipment transported.

The new brick is floated in on barges, weather permitting. The whole fort also needs tuck-pointing—replacing the mortar—and the myriad pipes leading to the cistern under the parade ground for collecting rainwater are in disrepair. The septic system needs a major overhaul, and the magazine and "hot-shot" furnace—a brick oven designed to heat the cannonballs so they could be lobbed into the holds of wooden ships to set them afire—want restoring. All this requires more millions of dollars, and the National Park Service has approximately 23,000 other historic structures competing with Fort Jefferson for such funds.

AND NOW THE INVASION

THE PARK'S NEWFOUND POPULARITY bothers Foster more than the isolation or the physical problems. "Visitation has exploded. People spill off these big boats, and more come on the seaplanes." The invasion envisioned by the fort's planners was merely delayed, and its nature altered.

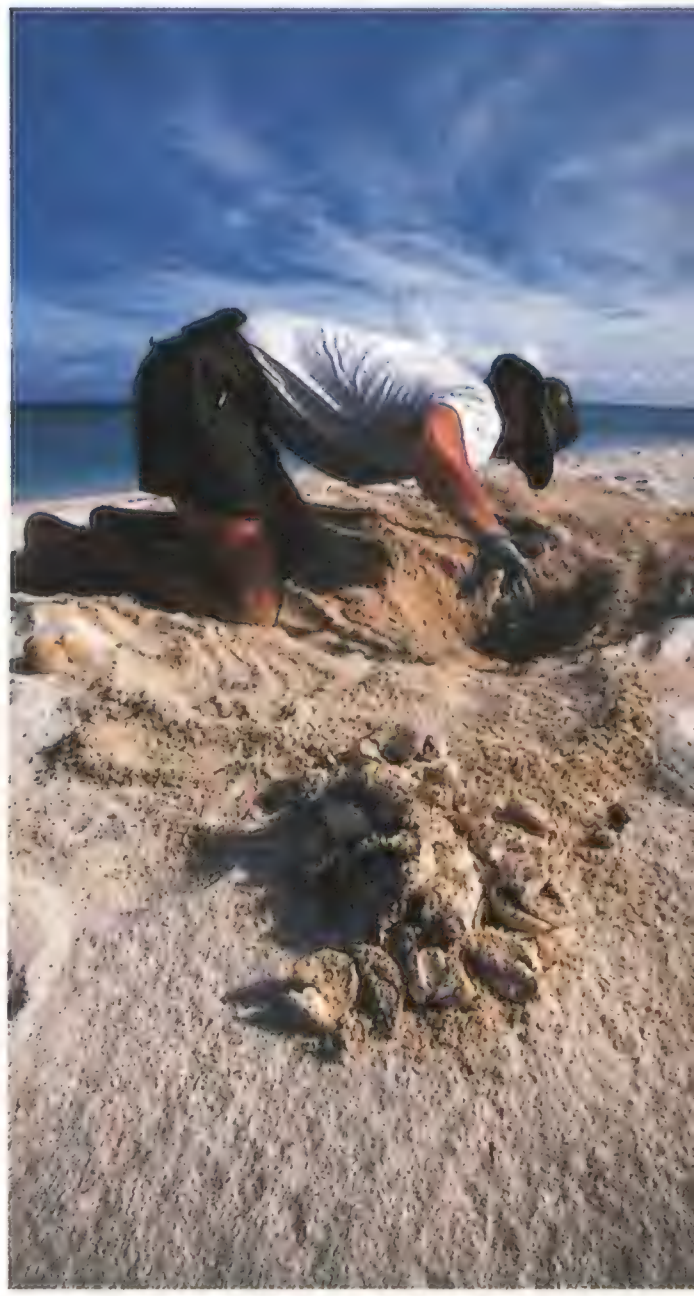
For 15,000 years the only visitors were prehistoric seafarers who took little and left less behind. Ponce de León landed in 1513 and named these sandy keys after the legions of turtles, but he found no drinking water. Consequently the Spanish took little interest in the place, even though it lay on the shipping lanes between Cuba, Central America and Europe.

Possession of Florida passed from Spain to the United States in 1821; Fort Jefferson was soon planned to be the largest of the coastal forts that guarded the nation's commerce and harbors, and the southernmost anchor in the system, defending against invasion and protecting shipping between the mouth of the Mississippi River and the Atlantic. In 1846, it began to rise on Garden Key. In the 1850s, brick was brought from Pensacola, 500 miles to the north, and cement and stone from New York, 1,500 miles distant, and was set in place by slaves and supervised by the redoubtable General Totten.

The introduction of heavy rifled cannon around the middle of the 19th century meant all the masonry forts could be methodically demolished by ships' cannon. Work continued on Fort Jefferson nonetheless.

Irish labor was added to slave labor

From far left: Park maintenance supervisor Mark Foster inspects windows of the recently restored harbor light; ranger Paul Taylor patrols the Dry Tortugas harbor as a squall brews; and sea turtle researcher Russell Reardon excavates a nest of newly hatched eggs to collect data.



during the Civil War, by which time the difficulties of life in the Dry Tortugas were clear: thirst (steam condensers had to supplement the rainwater in cisterns, many of which cracked as the fort settled); absence of fresh produce; salted meat that quickly went rancid; a moat full of sewage; mosquitoes; scorpions; heat; and storms that rendered impassable the only medium of communication between fort and mainland.

The fort was established as a military prison in 1861. Union deserters were brought here, and then Dr. Samuel Mudd, implicated in the assassination of President Abraham Lincoln because he treated assassin John Wilkes Booth's broken leg. Sent by Washington to what was described by assassination conspirator Samuel Bland Arnold as "that fatal isle, the Dry Tortugas . . . depicted as a perfect hell," Mudd found the words "Whoso entereth here leaveth all hope behind" inscribed over the entrance to the casemate serving as his cell. The fort's prisoners ate bread "of flour, bugs, sticks and dirt" and meat rotted "to such an extent that dogs ran from coming in contact with it," and drank foul water.

Mudd tried to escape in the coal hold of a transport and was apprehended and put into leg irons, a further torture. Fort Jefferson's most famous resident then redeemed himself in the eyes of many historians by ministering to the victims of a yellow fever outbreak, one more thing in an accumulation of miseries. Mudd and Arnold were pardoned in 1869, and five years later the fort, in the last stages of administrative entropy, its original mission abandoned, was left to the elements.

Garden Key remained for a time a coaling station for American vessels; the USS *Maine* refueled here in 1898, before crossing the Florida Straits to Havana where it exploded and sank in circumstances that contributed to America's decision to expel Spain from Cuba. In 1908 the Dry Tortugas was made a wildlife refuge, to protect the eggs in the tern rookery, and in 1935 President Franklin D. Roosevelt declared it a national monument, albeit one in almost complete disrepair. The enlisted men's barracks had burned, the docks had deteriorated,

Commercial floatplanes from Key West speed visitors to the Dry Tortugas. With prior permission, private floatplanes may visit, too.

bricks had tumbled into the moat, and everything of value that could be loaded onto a boat had been plundered. It was not until 1992 that the Dry Tortugas became a national park.

Those responsible for what is left have obvious advantages over their predecessors—refrigeration and the internal combustion engine being prime ones. Some thrive on the daily rhythm. Alan Walsh, the park's mechanic, who actually keeps the seven generators humming, plus the two tractors, the forklift, the mower, six boats and innumerable other devices, reminds me of a latter-day Robinson Crusoe. He had been a machinist's mate on a nuclear submarine. The isolation of the Dry Tortugas is nothing compared with what he had experienced living under the ocean, he says, adding, "No bikini babes down there."

The turtle researcher, a lean naturalist named Russell Reardon, spends between 10 and 12 hours a day in the sun, checking for turtle crawls on the beaches. Now in his fifth season, he came originally as an AmeriCorps member and these days earns a living through a patchwork of research grants and the kindness of fellow islanders. "I'm a kind of scavenger. I might eat with one of the rangers and do his dishes in return."

Kelly Bulyis, the 27-year-old "interpretive park ranger" whose job it is to explain natural and cultural history to visitors, has been at Fort Jefferson only six months and is still adjusting to the unusual conditions. "The first thing visitors ask me is, 'Do you live here?' A lot of them can't believe I really do."

All this human history of the Dry Tortugas is just a moment in the saga of evolution. I am reminded of this when I return to the *Yankee Freedom*. I stand at the rail and look down into depths illuminated by a single halogen lamp. Shrimp and fry swarm at the surface, while below them big tarpon course back and forth like thick scimitars of quicksilver, gorging themselves, unhurried and unceasing, their eyes bloodred in the reflected light.

The species here also include snappers, groupers, grunts, wrasses, triggerfishes, shrimp, conch and innumerable microscopic creatures. This vital nursery to the deep—its reefs, sea grass meadows and sandy flats—extends beyond the edges of the park's small, watery footprint. Out there, commercial fishermen gather for the bonanza, on one of the few fertile fishing grounds from which they can quickly motor to a safe harbor—the park's—and have dinner and spend the night before returning to the take.

In 1997, the Florida Keys National Marine Sanctuary (FKNMS), which is administered by the National Oceanographic and Atmospheric Administration and the State of Florida, proposed a Tortugas Ecological Reserve, to be established just east of the park. This was to be part of the existing sanctuary that envelops the keys and in which FKNMS seeks to protect biodiversity, particularly that of the coral reef ecosystem. Most traditional uses, including fishing, are allowed within much of the sanctuary, but the reserve would be off-limits to all fishermen, commercial and sport, and to divers intending to do anything but look.

The effort was dubbed Tortugas 2000, and the area to be set aside would be less than 200 square nautical miles, a figurative drop in the ocean. But the announcement set off a cacophony of contending voices as commercial fishermen and some salvagers and divers claimed their rights

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and livelihoods were being abridged by the federal government, while environmentalists were concerned that the wrong area would be protected. To give all a voice, representatives of the various stakeholders in the Dry Tortugas were brought together as part of a 25-member advisory panel. Studies were done, public hearings held, and gradually, sometimes acrimoniously, the metaphoric ship of the ecological reserve is moving toward port.

Consensus eventually surfaced when the Florida Keys National Marine Sanctuary Advisory Council unanimously recommended creating two reserve zones comprising 185 square nautical miles. One, south of the Dry Tortugas, would protect the snapper and grouper spawning grounds of an area known as Riley's Hump. The other, to the north, would include 34 square nautical miles of the park's sea grass and shallow coral reef habitats. Diving and snorkeling would be allowed, but no marine life could be taken, commercially or for sport. A supplemental environment impact statement has to be prepared, and more hearings held, but if this two-part reserve is accepted by all the agencies involved, FKNMS expects the plan to be in full effect by summer 2000.

Designation of the reserve has been further complicated by bureaucratic maneuvering. The currently recommended proposal calls for the eastern boundary of the reserve and the northwestern boundary of the park to overlap, so enforcement would be shared. But the Park Service, chary of its turf and sensitive to criticism that its regulations discriminate against any user, wants to study visitor use in the entire park before deciding whether sportfishing will continue in the Dry Tortugas. The big chartered "head" boats for group fishing are no longer allowed.

By the fort's moat wall, corals, sea fans, turtle grass and sandy flats provide underwater scenery for tourists.

"Tortugas 2000 has put the spotlight on my turtle research," says Russell Reardon. "My work is a long-term resource monitoring program already in existence. Research and resource protection are the focus of the ecological reserve."

It is Saturday morning. He has just returned from checking the beaches on the outlying keys where he will soon be observing turtles crawling from the surf to deposit their eggs. There is a great deal yet to be learned about turtles, he says. "Here we have a park named after the turtles, and we don't know very much about the critters."

The habitat is ideal: no raccoons to eat the eggs, no rubble on the beaches to prevent their being laid, no lights to attract the hatchlings. But there are threats nonetheless, and not just fishing nets and boat props. "I see the visitor impact," Reardon says.

One of the daily ferries from Key West docks as we talk, its railings crowded with the visitors who have made the 2½-hour journey, past the ring of islands known as the Marquesas Keys and the lonely stretch of shallows called the Quicksands, despite reports of the front coming from the north. They disembark in swimsuits and dark glasses, smelling of suntan lotion, and, sure enough, long lines immediately form outside the rest rooms. It seems to me that these visitors could with justification be asked to pay a fee to use the park, and made to heed instructions about its fragility. But no one here is empowered to demand these things, the administrative decisions all being made at headquarters in the Everglades.

A few of the new arrivals have binoculars strung around their necks. They head for the trees instead of the beach, to join the other bird-watchers. Members of the Tropical Audubon Society will identify 97 species by the end of their two-day stay, including a prime life-listing: the short-eared owl, on a jaunt from Cuba, perhaps to feast on "Tortugas squirrels" (rats).

I meet a diminutive man in Bermuda shorts and a baseball cap, Bill Robertson, a retired National Park Service research biologist who worked in the Everglades for more than 40 years and has been coming to the Dry Tortugas since 1956, when he spent his honeymoon here. He takes a break from the movable ornithological feast and sits at a picnic table in the campground, with a view of the moat and the broad, blue sea.

"The problem here isn't a shortage of sewage capacity," he says, following the arc of an orchard oriole, "but of upland area. That little clump of buttonwoods over there has 40 or 50

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At night, the park supply vessel *Activa* lies dockside at Garden Key after a trip out from Key West. Out in the harbor, commercial lobster boats anchor until morning.

species of birds in it. Most of those birds in the spring and fall migrations are insectivores, so you can't destroy the vegetation without running into major problems."

He adds, "We're on the edge of a big change. In a decade the Dry Tortugas has gone from a place with few visitors and staff to a major tourist destination. The big question is, can the place, and the Park Service, react appropriately and in time?"

The bosses up in Everglades National Park are requesting $240,000 from Congress to beef up management of the coral reefs, which would mean hiring a full-time natural resources manager and another ranger. A draft visitor-use and concessions plan is in the works to determine exactly how many visitors will be allowed in the future, with an increase expected, but there will be no store, no restaurant and no soda machine. When I asked the deputy superintendent at the Everglades about expanding the sewage facilities, he said, "We need to study that."

Back on the Boston Whaler, Paul Taylor and I reach the dock under a spitting sky after our abortive trip to Loggerhead Key. A gale lifts dust from the campground, then the towels of sunbathers, who race for the covered dock house in a riot of flapping mattresses and overturned coolers. The harbor comes alive, the boats rearing on their anchor lines.

The rain hits in force as I sprint across the bridge of the moat, drowning out the cries of the day-trippers, the wind driving leaves and dirt that sting like shrapnel through the fort's tunnel-like entrance.

A clutch of visitors stand with faces to the wall, prisoners of this meteorological bombardment. I take the spiral stone staircase to the second level and make my way along an open corridor, under the long succession of gorgeous brick archways beaten by rain blowing in horizontally through the open gun ports. Beyond the moat wall, waves leap and fling their spray, backed by a wildly fractured sea, the fort a monolithic impertinence in the midst of tempestuous, leveling natural forces.

As the wind slackens, warblers, cuckoos and indigo buntings flit among the gumbo-limbo trees in the courtyard, stalked by the intrepid birders, their wet slickers as bright and varied as the colors of the quarry. On the other side of the fort, in the Boston Whaler, stands Paul Taylor, having untangled the lines and prevented two boats from being blown toward Mexico. He presents a lonely, resolute figure, facing the weather, hat and bullet-proof vest soaked with rain, thinking: it's only water.

James Conaway is the author of The Smithsonian *(Alfred A. Knopf, 1995). Both he and Regis Lefebure endured some Tortugas squalls to get this story.*

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FACING HISTORY

Images of African-Americans Illuminate a Proud Past

"IT IS AS THOUGH A DARKENED VEIL IS before us and these photographs have come together as a new light," says Jackie Napolean Wilson, referring to the images in his book *Hidden Witness: African-American Images from the Dawn of Photography to the Civil War*, due to be published in January by St. Martin's Press. So lacking are African-Americans from the visual record of the Civil War that "if one were to make a photographic assessment of America at that time, one might ponder where the subjects of this great conflict were," writes Wilson. He believes that we must have an accurate view of history, in all its complexity.

The daguerreotypes, ambrotypes and tintypes shown here, dating from c. 1845 to c. 1865, are unique in their depiction of the broad range of African-American life, according to Deborah Willis, an associate director of the Smithsonian Institution's Center for African-American History and Culture. The man with medal and cornet, above, was but one of many black firefighters in the mid-19th century. The photograph at right is reminiscent of classic images of the Madonna and Child. The woman is thought to be cradling her own child, making this a rare historical image. African-Americans often managed to maintain families despite the illegality of slave marriage and the common practice of selling off slaves' children.

American history education has long told the story of remarkable individuals like Sojourner Truth and Nat Turner, but *Hidden Witness* presents images of ordinary African-Americans who were integral parts of the culture, economy and development of this country, and who were heroic in their everyday resistance to subjugation. The pictures in this collection allow us to see the faces of the skilled craftspeople who labored to provide for their families, the field slaves who sewed quilts and ran illegal midnight schools, the free blacks who worked to buy their freedom and lived under constant threat, and the free blacks who owned businesses and formed aid societies. Four and a half million African-Americans resided in this country at the time of the Civil War, and we can now see that they were hiding in plain sight.

—*Angela M. Pleasants*

JACKIE NAPOLEAN WILSON COLLECTION/J. PAUL GETTY MUSEUM

Though few in number, well-to-do free blacks shared the sartorial and cultural sensibilities of their white patrician neighbors out of both pride of accomplishment and fear of being game for slave hunters. Above, from left: A cityscape backdrop signifies this woman's wealth and worldliness; two young men sport handsome suits with silk cravats. Right: Clergy, such as this minister, played an important role in the lives of free blacks, as churches were a crucible for faith, progressive idealism and social reform. Some clergy and their wives also aided runaway slaves in their churches.

By the end of the Civil War, just eight years after the Supreme Court ruled in the Dred Scott case that blacks were not American citizens, more than 200,000 black men had fought in the bloodiest war Americans had ever known. At left, a soldier poses with his companion; keepsakes like this tintype were especially important because of the high casualty rate. Free blacks of means captured their cherished unions in portraits such as the one below, one of the earliest known photographs of a free African-American wedding scene, c. 1860.

Slaves belonging to Rebel general *Thomas F. Drayton gather (above, left) with a Yankee soldier during Union occupation. Slaves retained some African customs; here, the women wear African-type headwraps, and both men and women carry buckets and baskets on their heads. Young slaves had little childhood, being put to work as early as age 4. Top right: A girl wearing a dark dress is a nurse and companion to her master's child. Bottom right: A free black woman and girl seem accustomed to freedom as evidenced by their stylish clothing and direct gaze. There is no one description of a free black: some escaped slavery, some bought or were granted their freedom, and others had always been free in America. Left: A young boy wearing a roundabout jacket has a look of dignity and innocence. Far left: "Death portraits" were a common mid-century expression of grief among whites; this image of a black child is rare.*

It's More Than Just a Game

EACH TIME ARMY AND NAVY PLAY FOOTBALL, AS THEY WILL FOR THE 100TH TIME NEXT MONTH, THE FIERCEST RIVALRY IN SPORTS IS RENEWED

BY BRUCE WATSON

The cadets are all spit and polish when they enter the stadium for the traditional March On (opposite), but once the game begins many rabid Army fans (above) and zealous midshipmen (right) shed regulation uniforms, along with inhibitions.

FROM HIS VANTAGE POINT OVERLOOKING THE HUDSON RIVER at West Point, New York, an Army officer surveyed his troops at play. Maj. Oswald H. Ernst, Superintendent of the U.S. Military Academy, was concerned. A few years earlier, some sports nut at the Naval Academy in Annapolis, Maryland, had suggested a football game between Army and Navy. West Point didn't have a team, but an eager cadet volunteered to form one. The game had been played with little damage—a concussion, a broken nose, a few skinned egos. Army was trounced, and that might have been the end of it. But then there was another meeting the following autumn. And another. By the fall of 1893, the rivalry was beginning to get out of hand. Fistfights had broken out in the stands. At the Army-Navy Club in New York City a duel between a rear admiral and a retired

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general was narrowly averted. Football was a fine game for future soldiers, Ernst believed, yet this contest was becoming more than just a game. "The excitement attending it exceeds all reasonable limits," he lamented.

In February 1894, President Grover Cleveland convened a special Cabinet meeting to discuss Army-Navy football. The annual game was causing conduct unbefitting officers and gentlemen. Imagine future generals standing on their heads and waving their heels after a touchdown. Picture prospective admirals devising silly pranks to play on their opponents. After the stormy Cabinet meeting was over, the Secretaries of the Army and the Navy issued edicts that, in effect, canceled the game. For the next five autumns, the academies played the nation's top football teams, Princeton, Harvard and Yale. But not until President William McKinley restored the rivalry a century ago did Army and Navy face each other again. By then, the captains of the first games had been killed in the Spanish-American War.

Early next month, Army and Navy will square off on the gridiron for the

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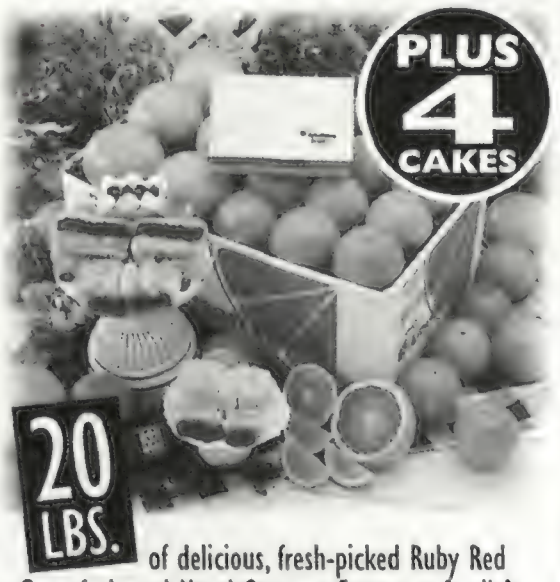

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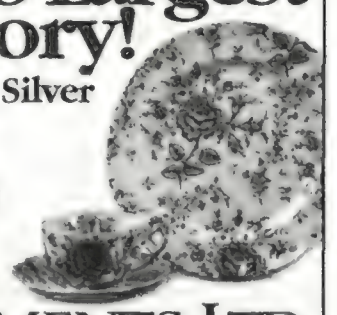

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Navy's 1890 team, the first to play Army, lined up for a postgame portrait at West Point. Because it was so well drilled, Navy trounced the cadets by a score of 24-0.

100th time. It's safe to say that no national championship will be at stake. No player from either squad will win the Heisman Trophy; few, if any, players will be drafted by the National Football League. Yet a crowd of almost 70,000 will be at Veterans Stadium in Philadelphia. Top military brass and possibly President Clinton himself will shout like cheerleaders at a high school matchup. At kickoff time, whether it's 2 A.M. in Korea or mid-evening in the Mediterranean, every soldier and sailor who can get to a TV set will be watching. And if the 99 prior contests are any indication, the two teams will put on one of the best shows of the year, complete with full-dress marching parades, cannon, raucous singing and a thrilling game that will go right down to the final minute.

Yet to call Army-Navy a game is like calling D-Day a skirmish. There are other great college rivalries, but when Ohio State plays Michigan, do Blackhawk helicopters fly over pep rallies? When USC battles UCLA, is every last student from both schools shouting in the stands? For one afternoon, Army-Navy may be a game, but the rest of the year it isn't about football. It's about a passion as big as the Pentagon. It's about hope soaring like a thousand white caps thrown in the air. And it's about a feud as intense as any sibling rivalry. Navy free safety Gary Lane used to think it was just a game. "Then I saw players crying in the locker room, the toughest guys I knew just blubbering like babies after we lost. And hugging the Army team even though we don't know any of them. Army-Navy is like playing your brother. You play harder, but you share something because you know what the other guy has been through."

The fiercest rivalry in sports was inspired by a friendship. Army Cadet Dennis Michie (pronounced "Mikey") was raised at West Point by his father, who taught philosophy there. Michie had a friend at the Naval Academy who shared his love of football, the head-battering sport that was taking over college fields in the late 1800s. Navy had played intercollegiate contests since 1879, but only a few of the young men at West Point

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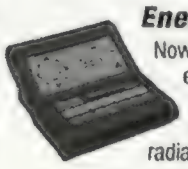

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had ever participated in an organized game. Michie had no doubt his fellow cadets would take to football once they were introduced to it. He used his influence to arrange for a formal challenge. Navy issued that challenge in October 1890, and after a dedicated campaign waged by Michie, Army accepted it.

All West Point cadets weighing more than 180 pounds were ordered to report for practice. While talk of first downs and flying wedges swept through the barracks, Michie began waking his recruits before reveille to run. They had only eight weeks to learn the fundamentals. The hosting Army cadets pooled their resources to pay half of Navy's travel costs, and on November 29, a cold, gloomy day at West Point, a happy bunch of Naval cadets, as the midshipmen were called

CORBIS/BETTMANN-UPI (2)

then, trudged up the hill from the Hudson. Along the way, they kidnapped a goat for their mascot. On the Plain, West Point's parade grounds, they found 1,000 people and 11 football players waiting.

Navy won the toss and got the ball. As Army huddled, the commandant announced, "I shall slug the first Army player who leaves the field in an upright position." In military jargon, a "slug" meant a demerit, but the message was clear. On the first play, Navy went into a V formation. The quarterback barked out signals. "Reef the topsail!" he shouted, and Navy's halfback slammed into Army's line. "Stand by to clear anchor!" and another Navy surge moved the ball forward again.

After Navy scored, Army improvised its own martial signals, but they were largely just for show—"In battery, right heave!" "As skirmishers, march!" Army's players didn't have a clue what the signals meant, and soon Navy got the ball back.

Army fans cheered when their tackle grabbed Navy's star halfback and spun him around, but the runner broke free. "When I stopped him, I heard a lot of yelling from the sidelines," the tackle explained. "I thought I had done something wrong, so I let him go." Navy won 24-0 and Army vowed revenge.

The next fall, after practicing with a former Yale player, Army journeyed to Annapolis, scored on its first possession and went on to win easily. When the news was telegraphed to West Point, the captain of the corps assembled the cadets and barked: "Final score! Army 32, Navy 16! Dismiss your companies!" The cadets erupted, lighting a bonfire, singing, dancing jigs in front of each officer's home. The following year, a similar lapse in military discipline took place at the Naval Academy when Navy won. Steeped in honor and tradition, neither Annapolis nor West Point would ever again seem so somber.

More than a century later, as a

Navy's goat met Army's mule (left) before a 1923 contest. Three years later, 110,000 fans at Chicago's new Soldier Field (above) watched a game that ended in a tie.

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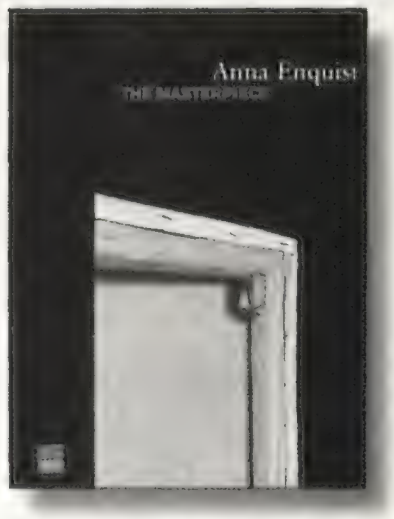

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MEMBER

When Douglas MacArthur was in charge at West Point, Army couldn't beat Navy.

freshman at West Point, Achim Biller made a common mistake. He thought Army-Navy was just a football game. His mind was changed for him by Beast Barracks, West Point's hellish summer indoctrination of its plebes. During those six weeks of punishing drill, and more drill, Biller was required to memorize "The Days." Whenever he was stopped by an upperclassman, he had to bellow out how many days remained until certain events, finishing with the number of days "Till We Beat the Hell out of Navy, Sir!" The countdown continued until after Thanksgiving when Army-Navy Week forced plebes to learn new rules. Classes convened, but only out of habit. Write "Beat Navy!" on a class paper and you might earn extra points. Shout "Beat Navy, Sir!" to an upperclassman's orders and all was forgiven. Sleep was a luxury in dorms filled with fraternity-type chaos, and attendance at all pep rallies was expected.

At Thursday night's rally on the Plain, Biller anticipated more harmless high jinks. He didn't expect an armored offensive. After a boat labeled

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"Navy" became a bonfire, an M-1 Abrams tank rumbled over the top of a pickup truck bearing the blue-and-gold Navy insignia. Several cadets jumped out of the crowd and further demolished the truck with sledgehammers. Then a Blackhawk helicopter sent Army Rangers repelling down ropes. Finally, West Point superintendent Daniel Christman, the very model of a lieutenant general, stepped before the rally. After he gave a rousing pep talk, the "Supe" tore off his shirt in the 20-degree weather to reveal a T-shirt emblazoned with Army's familiar A logo. Cadets chanted "Beat Navy! Beat Navy!" "That gave me the idea of the game's magnitude," Biller recalls.

"Beat Navy! Beat Army!" The words are tattooed into life at each academy. In Annapolis' stately Bancroft Hall, "Beat Army!" is the first thing midshipmen hear each morning all year round. Plebes, required to dash everywhere, must shout "Go Navy, Sir!" or "Beat Army, Sir!" at every turn. "You hear 'Beat Army!' a thousand times a day here," says Navy defensive captain Jamie Doffermyre. During Army-Navy Week, Navy's plebes are "invited" to drink a nasty kitchen concoction called a "Beat Army!" Last year, Matthew Mariano's "Beat Army!" included ketchup, Jell-O, peanut butter, salt, pepper and salad dressing. "It wasn't too good," he remembered with a sheepish grin, "but it was fun to know I was part of the tradition."

At West Point, near bleachers imprinted "Army Beat Navy!" stands the Beat Navy tunnel chiseled with the scores of Army's 48 wins in the series. (Navy has won 44; seven games ended in ties.) And at academy stores, the faithful can buy Army-Navy chess sets, mugs, T-shirts, pillows and bumper stickers bearing the respective mantras. At other schools, this might be dismissed as mere adolescent obsession, but when Army

A 1920s display of footballs commemorated Navy victories. The midshipmen took an early lead in the rivalry but Army caught up. Navy has won 44 games, Army 48.

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plays Navy, men will be boys, regardless of their rank or station.

In 1901, President Theodore Roosevelt, drawn to all masculine endeavors, attended the Army-Navy game. The rivalry was already the nation's biggest sporting spectacle, drawing 25,000 fans paying up to $40 for a scalped ticket. To avoid the appearance of partisanship, the President sat on Navy's side during the first half and Army's after halftime. But when Navy tied the score 5-5, Roosevelt, who had been Assistant Secretary of the Navy under President McKinley, broke free of his Secret Service guards, leaped a railing and ran whooping to Navy's bench to shake hands with the players. Army went on to beat Navy 11-5.

As Roosevelt knew only too well, football, which in those days was played without helmets or pads, was becoming increasingly controversial. In 1905, 23 players were killed on the field. Several colleges had banned what one professor called "this boy-killing, man-mutilating . . . gladiatorial sport." But at Army, where injured players were taped up, given a glass of whiskey and sent back into the fray, Capt. Palmer Pierce disagreed. Even if no one else played football, he announced, Army would.

Several colleges had banned what one professor called "this boy-killing, man-mutilating sport."

Navy backed him up. At a White House conference, Pierce then helped devise rule changes that led to the creation of the modern game.

By the 1920s, famed sportswriter Grantland Rice was hailing Army-Navy as the "biggest show on earth." And even in the heyday of such gridiron titans as Red Grange and Knute

A fan depicted on the cover of the 1936 program upheld the spirit of neutrality.

Rockne, Army-Navy lived up to that billing. The two teams were football powerhouses, mowing down opponents by scores such as 90-0. The throng heading annually to the big game at Philadelphia's Franklin Field included graying admirals and generals in uniform, enlisted men in khaki, sailors in jaunty white caps, foreign ambassadors and the President himself, sometimes with his entire Cabinet. On the field, Navy's brass band boomed the song it had debuted at the 1906 Army-Navy game, "Anchors Aweigh." Thousands of voices roared out the verse ending "Sink the Army, Sink the Army Grey!" Army's band answered with "On, Brave Old Army Team." Then came the game, often an unforgettable one.

In 1926, Army-Navy dedicated Chicago's new Soldier Field. Chartered trains carried 3,100 roaring cadets and midshipmen to Chicago, where they became the talk of that toddlin' town. During two whirlwind days, the nation's future officers attended luncheons and dinners, and danced with young women brought in from nearby states to be their

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dates. There was also a football game. Navy was undefeated, and Army had lost only to Notre Dame. More than a half-million people had requested tickets. The 110,000 lucky fans who got them weren't disappointed.

Navy jumped out to a 14-0 lead, but Army scored on its next drive, then recovered a fumble and ran it into the end zone. At halftime, the score was tied 14-14. Early in the second half, Army scored again on a 44-yard run. But after the cadets missed a field goal, Navy intercepted with just four minutes left to play. Pointing to the goalposts 65 yards away, Navy's captain declared, "We're going to cross the line." Marching down the

Cadets rejoiced last year after their Army team sank the midshipmen 34-30.

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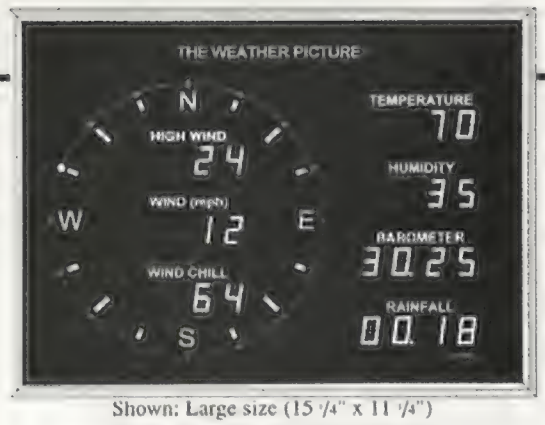

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field, Navy reached the Army 8-yard line. It was getting dark in Soldier Field, and the players, in their muddy jerseys and leather helmets, looked like gray ghosts on a gridiron rimmed with snow that had fallen the day before. On fourth down with three yards to go, Navy called a double reverse. Halfback Howard Ransford faked a run to the right and slipped

A 1940s banner depicted Army's Glenn Davis (41) and Doc Blanchard (35).

the ball to Alan Shapley. While Army charged after Ransford, Shapley scampered into the end zone. Then the stadium fell silent for the extra point. Drop-kicked neatly through the goal posts, it tied the game at 21-21. In the final minute, after trading possessions, Navy tried a desperation pass. Army's "Light Horse Harry" Wilson intercepted, broke two tackles and sprinted for the goal line. But Navy dragged Wilson down at the 40 as the gun sounded. Army took home its pride and Navy brought back its first and only national championship.

Every college team has local fans, but when Army and Navy were winning world wars, they played for the nation, as sportswriter Paul Gallico explained: "The Army-Navy game is the yearly parade of the future com-

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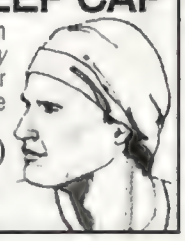

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manders of the armed defenders of the United States. This is serious business. Watch these boys play. Watch them think. Watch their moves. Our lives may someday be in their hands." Other college players went off to professional careers; Army and Navy players went off to war. From Navy's 1935 team, 13 players were killed in action during

A flyer lampooning the Army mascot was printed and distributed by midshipmen.

World War II. Army lost more than 20 former players in the two world wars. And as the rivalry turned 50, its veterans included Army lineman Omar Bradley and halfback Dwight Eisenhower, Navy fullback William "Bull" Halsey and halfback Richard Byrd. Those who don't know a first down from a fastball might remember those stalwarts by their other titles—general, President, admiral, and commander of the first flight over the North Pole. But the most zealous fan was a cadet too slight to try out for Army's team, Douglas MacArthur.

First in his class at West Point, young MacArthur also served as football team manager in 1902. Nearly 20 years later, as West Point's superintendent, he paced the sidelines at every football practice, his riding crop

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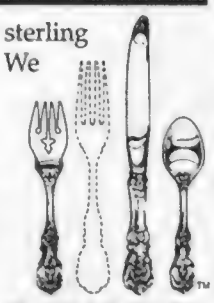

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under his arm. In 1928, Army and Navy feuded over the number of years players should be eligible for football, which resulted in cancellation of the game. It was resumed in 1932 when MacArthur, citing football's military value, talked Navy's superintendent into an armistice.

During World War II while commanding U.S. forces in the Pacific, MacArthur set the war aside every Monday morning each fall to spend hours poring over reports of Army's latest game. After each victory, he wired congratulations; after each loss, he wrote lengthy advice to Coach Earl "Red" Blaik. The British may have won the Battle of Waterloo on the playing fields of Eton, but MacArthur gave Army football credit for even more. "Upon the fields of friendly strife are sown the seeds that, upon other fields, on other days, will bear the fruits of victory," he pontificated.

The war caused some departures from tradition. For a couple of years, the game had to be played at the academies, and the student bodies were unable to travel. That threatened to put a serious crimp in the spirit that was such an important part of the contests. When the cadet team visited Annapolis, half the midshipmen were required to cheer for Army (which reciprocated the following year, when Navy traveled to West Point), though of course they cheered much louder after their own team scored. Navy even went so far as to recruit a local mule to stand in for the Army mascot, but when the designated handlers attempted to mount and ride the balky substitute, he unceremoniously bucked them off.

Just 17 days before the 1944 game, President Franklin Roosevelt decided that the teams should play in Baltimore to benefit the war bond drive. The bigger the bond a fan bought, the better the seat. Ticket prices ranged from $30 to $100,000, and more than a dozen six-seat blocks sold for $1 million apiece. Each team was escorted

to the game by Navy convoy, and fans got their money's worth. Army was undefeated, averaging nearly 60 points a game, and holding its opponents to just 4. Navy was ranked second in the nation behind Army. And the game marked the spectacular Army-Navy debut of "Mr. Inside" and "Mr. Outside."

At 2 A.M. on December 3, 1944, near Leyte in the Philippines, Lt. Gen. Robert Eichelberger listened to the game from Baltimore on Armed Forces Radio. When it was over, Eichelberger and several officers piled into a jeep. Careening across muddy roads in the pitch-black night of a tropical downpour, they reached the front. There they slogged through mud and rain to find Col. Charles "Monk" Meyer, an all-American quarterback on Army's 1935 team. Celebrating Army's 23-7 win, the jubilant officers drank a toast to honor the names Blanchard and Davis.

Fullback Felix "Doc" Blanchard and halfback Glenn Davis were perhaps the best college backfield of all time. Blanchard, "Mr. Inside," hammered up the middle through enemy lines. And Davis, "Mr. Outside," used his world-class speed to race for TD's around either end. In three years at Army, they scored an unbelievable 97 touchdowns, running for one each in their first Navy game and combining for eight in the next two. Powered by its backfield, Army was the best team in the nation, unbeaten from 1944 through 1946. Heisman Trophy winners and nationwide celebrities, Davis and Blanchard later took their fame to Hollywood, where they starred in the corny film *The Spirit of West Point*. Yet Annapolis, too, had plenty of spirit. Even Navy's losing squads in the late 1940s and early 1950s managed to beat Army three times and tie it once. But better than those contests were the games played off the field.

Other college players went off to professional football; Army and Navy players went off to war.

A few days before the 1946 matchup, Navy invaded Army. Under cover of darkness, a team of midshipmen entered West Point and painted "Beat Army" on several monuments. The next day, Maj. Gen. Maxwell Taylor issued a bulletin: "A commando group raided West Point about 0100 today," the superintendent

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announced. "Although some damage was done . . . all participants are believed to have been captured. Upon being interrogated the men stood upon their rights under the rules of land warfare and revealed only their names and rank. . . . The prisoners are now at work repairing the damage to our defenses." A few years later, an Army spy learned about some provocative signs the midshipmen planned to use during the game.

Army has won six of the last seven battles, each in the final minutes by four points or less.

The cadets prepared several signs of their own. After a few songs mocking Army's weak schedule, Navy rooters unfurled a banner asking "When do you drop Navy?" Army answered with: "Today!" Navy's next taunt read "Why not schedule Vassar?" Army's sign responded: "We already got Navy!"

The pranks and popularity peaked early in the Cold War. Playing before the admiring eye of President John F. Kennedy, Navy enjoyed its finest years. As a Navy veteran, Kennedy reveled in the rivalry, twice meeting team captains on the field for the pregame coin toss. But eight days before what would have been his third game, Kennedy was killed. West Point and Annapolis shared the nation's shock. Army-Navy was postponed and left in limbo.

Finally, the President's widow asked that the two teams play on Pearl Harbor Day. Before flags flying at half-mast, the teams traded touchdowns and were tied at halftime. Then Navy's quarterback, having just won the Heisman Trophy, took over. Roger Staubach passed, ran, and even caught a pass as Navy beat Army for

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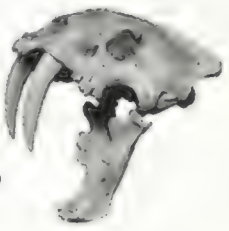

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the fifth year in a row. It was to be the last classic battle before the military and its cherished contest became increasingly overshadowed by politics, professional football and a war in Vietnam.

Even potential pros like Blanchard and Davis had put in the postgraduate military service required by both academies. But during the 1960s and '70s, few of the nation's best young players were willing to risk losing limbs, lives or years of a lucrative career in the National Football League to fight in Vietnam. Neither team has ranked in the nation's top ten since the war. During the 1970s, Army and Navy teams each made "The Bottom Ten," a humorous syndicated column listing the nation's worst college teams. Yet to veterans, Army-Navy remained a source of tremendous pride, and the game continued to be played before sell-out crowds.

In 1967, Navy pilot John McCain was shot down over Hanoi. During 5½ years in a North Vietnamese prison camp, the Annapolis graduate always greeted new prisoners with the same question. McCain, now Arizona's senior U.S. senator, didn't inquire "How's the war going?" or "Who do you like in the World Series?" He asked "Who won last year's Army-Navy game?"

The Reagan era and the Gulf War restored the nation's pride in its military, and a series of tight games has restored luster to the historic gridiron series. Army has won six of the last seven battles, each in the final minutes by four points or less. Mocked during the 1970s, the teams have done an about-face. A *Sports Illustrated* columnist, after suggesting Army and Navy "retreat with honor" from Division I-A football, had to apologize in 1996 when Army went 10-2 and Navy won the Aloha Bowl.

Yet come game day on December 4, records and reputations won't matter. At West Point and Annapolis, Army-Navy remains the test by which sea-

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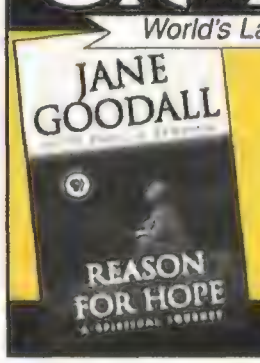
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sons are measured. "Last year we were 3-8," Army linebacker Adisa King says, "but it was a successful season because we beat Navy. I was on an Army team that beat Navy. I can take that to my grave." Win or lose, Army and Navy coaches hear from generals and admirals from all around the world. In his office at West Point's Michie Stadium, Army

"After what they go through the rest of the day, it's a relief for them to come to practice."

coach Bob Sutton brandishes an inch-thick stack of letters he received from veterans last year alone. Sutton hands out such letters to his players the night before the game.

Despite the pressure to win this big one, coaching at Army or Navy has certain advantages. Having Gen. Norman Schwarzkopf or Gen. Charles Krulak give a pep talk certainly fires a team up. And while they may not coach many future professional football players, neither Sutton nor Navy coach Charlie Weatherbie worries about discipline in this man's military, soldier! "You get to coach young men who really want to be here," Weatherbie says. "After what they go through the rest of the day, it's a relief for them to come to practice."

Last July, at Beast Barracks and the Navy's parallel punishment, Plebe Summer, raw recruits began the countdown to the game. Shouting "Beat Army!" or "Beat Navy!" they absorbed the obsession and tradition. In September and October, the two teams focused on other opponents, but come Thanksgiving, they will begin the friendly fire of Army-Navy week. No one will kidnap a mascot this year. That tradition has been officially banned since 1991, when a

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handful of midshipmen disguised as cadets entered Army's veterinary clinic, cut the phone lines, tied up the mule handlers, took the four mascot mules and caused Army to scramble Huey helicopters in pursuit. But rest assured, there will be no shortage of esprit de corps.

At West Point, Lt. Col. Henry Keirsey, chief of military training, will

Midshipmen disguised as cadets tied up the handlers and took Army's four mascot mules.

don his Viking helmet and roar through a rally on his motorcycle. Meanwhile, at Annapolis, normally stern midshipmen will flood the "decks" of their dorm to practice "carrier landings," racing and sliding on their chests down the narrow hall. More than one plebe will choke down a "Beat Army!" and yet another fresh coat of war paint will be slathered on the statue of Tecumseh in the Annapolis yard.

At blazing bonfires, the old names—Davis, Blanchard, Staubach—will be trotted out. The Thursday night pep rallies will be reminiscent of Anzio or the Battle of Midway. On Friday, the city of Philadelphia will host a gala dinner dance. Early Saturday morning both schools will head by bus to Philadelphia. Later that morning, at 9:40, cadets and midshipmen, spit and polished in their military grays and blues, will march onto the field at Veterans Stadium. After two hours of nonstop brass and banter, chanting and cheering, will come the kickoff. Only then, will Army vs. Navy be a game once again.

Bruce Watson boldly predicts the big game this year will be won by Army or Navy, unless the two teams battle to a tie.

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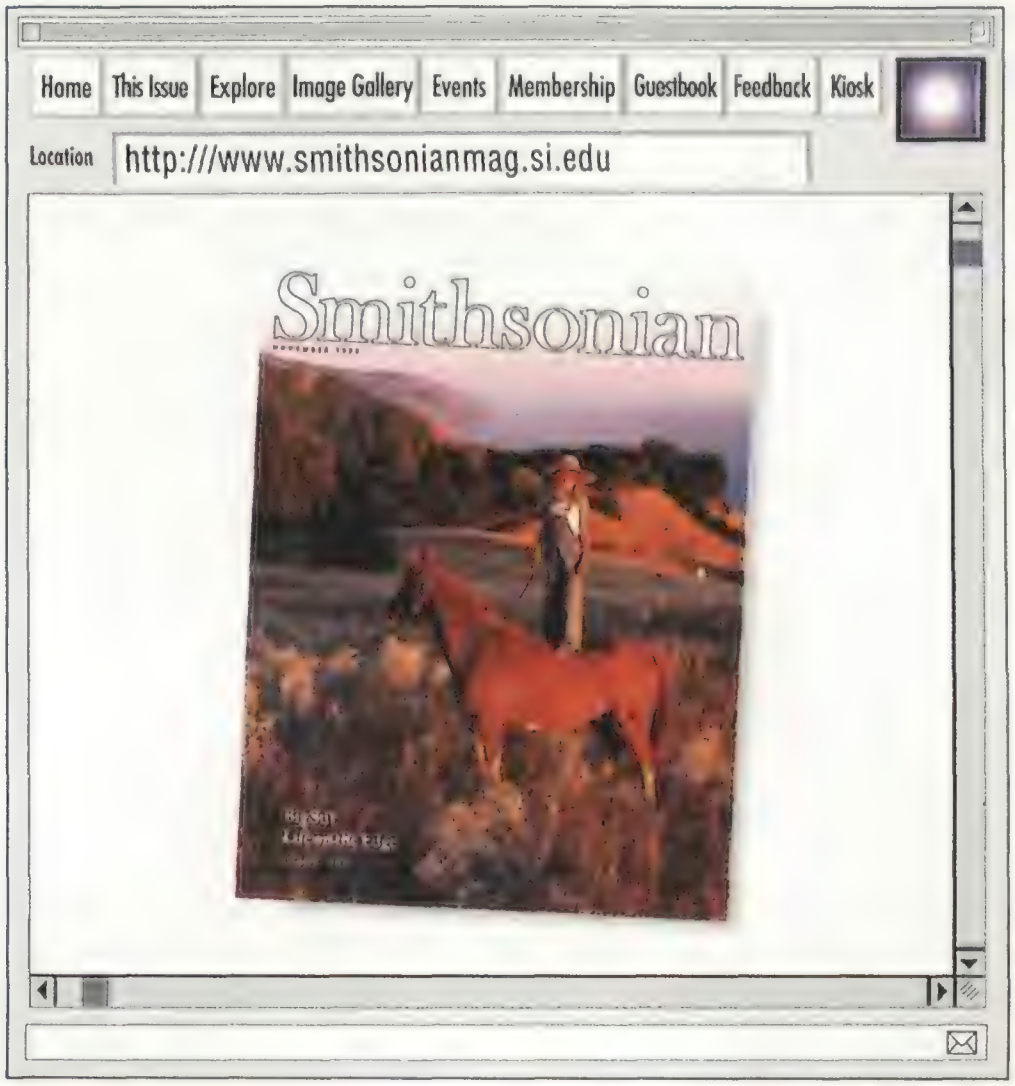

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THE LAST PAGE

Quicksand? Don't Sink, Just "Dance" Across It

BY BARBARA BECKWITH

MY HUSBAND LAYS SHIRT, SHORTS and boots on the rock. Pink as the sandstone around us, he walks toward the pool of water that blocks our way up this narrow canyon in southern Utah.

The pool is about the size of a big living room, maybe 30 by 20 feet. Jon will check its depth. If the water comes no higher than his chest—and my chin—we'll lift our packs over our heads and wade across. Any deeper and we'll turn around and try to find another route.

We're Easterners. We're familiar with fog and ice. Maine blackflies. Tree roots that twist ankles. Although we love these desert canyons, we know their perils mostly from books.

Jon steps into the chilly water. He yelps like a puppy, but strides on, buttocks bouncing. Soon, he's thigh-deep. "Easy wading!" he calls. His words end in a squawk. Jon's arms fling up, elbows stiff, fingers splayed. I hear the dread word: "Quicksand!"

Jon is smacking his hands against the surface of the water. He looks silly but inches closer.

Quicksand is odd: a bed of silt becomes saturated with water so that its grains no longer cohere. Heavy objects—a cow, a log, my husband—sink readily but can't easily rise. Quicksand creates a suction that makes it difficult to move anywhere but down, which is why creatures caught in it often die from exertion or starvation.

The locals assure us quicksand is a hassle, not a danger. "Do not panic," our map instructs us. "You will most likely not sink past your waist." But this quicksand is under five feet of water. If Jon sinks to his waist, his head submerges by at least a foot. He's already up to his armpits.

My husband of 37 years is disappearing. I look around for a long stick, but floods have scoured this canyon clean. I'd throw Jon a rope—if we had one. He sinks deeper. I pace the water's edge. Then suddenly, a mid-pool commotion. Jon is smacking his hands against the surface of the water and lurching forward. He looks silly but inches closer. I reach out, grab hold and pull. Finally, he emerges—a miracle of pink flesh.

I dry his mud-caked legs. Mystified, I ask how he escaped. He says he recalled something he once read in a book: quicksand takes a couple of seconds to break up.

Slapping the water for leverage, he began tiptoeing across the quaking surface of the siltbed before it could collapse. In that fashion, not unlike a giraffe pretending to be a member of the corps de ballet, he improvised a crossing to safety.

He's shivering. His skin is covered with goose bumps. I'm thinking: enough. Let's go back to hiking in New England where we know what's what. No more quicksand. No more near-death experiences, thank you very much.

Jon puts on his shirt, shorts and boots. He stands up, looks around and takes a deep breath. "Next time," he says cheerfully, "let's bring an inner tube."

DANIEL VASCONCELLOS

Lunch?

Sure.

Great. Let's go.
I'll drive.

No, that's ok.
I'll drive.

No, you drove
yesterday. And the
day before. I'll drive.

No, really. I'll drive.

I feel like I'm
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Really.

No, I'll drive. Really.

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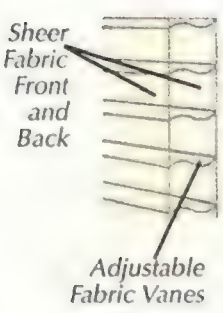

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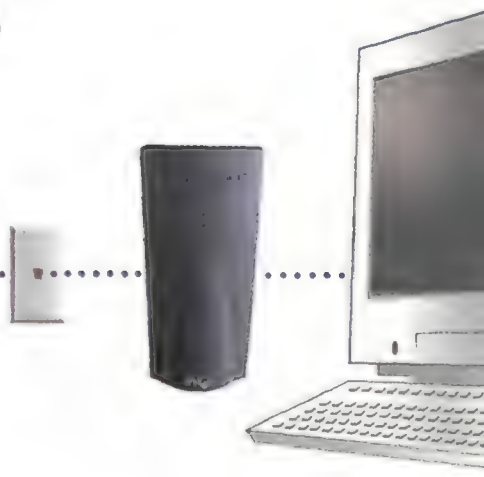

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A Letter from Ivan Selin

Recipients of the 1999 Computerworld Smithsonian Awards (CWSA) are leaders in information technology. Two honorees, Cisco System's John Chambers and Amazon.com's Jeff Bezos, are revolutionizing the way we do business. But the changes brought about by information technology in the past five years are only a foretaste of what is to come. E-commerce, for example, is changing America's purchasing habits. Geographic boundaries are disappearing. Consumers now have many more choices. Vertically integrated companies may be a thing of the past as customers, manufacturers and suppliers share all of the same information via the Internet.

Buying on the Internet is only one part of the story. According to a University of Texas study released in June by Cisco Systems, the Internet economy generated more than $300 billion in U.S. revenue and was responsible for 1.2 million jobs in 1998. Since the study also found that Internet e-commerce is growing at a much faster rate than expected, and that Internet workers are 65 percent more productive than non-Internet workers, the inherent implications for the future of American business are surely profound.

The second decade of CWSA will honor a different world of information technology. When the first awards were presented in 1989, the information techonology industry was in its infancy. Today, it is leading the economy. We are grateful that Patrick J. McGovern, Chairman of International Data Group and Founder of Computerworld, invited the Smithsonian's National Museum of American History and the chairmen of the leading information technology companies to join him in founding the Computerworld Smithsonian Awards program. We look forward to the next decade.

Ivan Selin, Chairman of the Board
National Museum of American History

A Letter from Spencer Crew

The National Museum of American History (NMAH) opened in 1964 as the Smithsonian's Museum of History and Technology. Governed by the Smithsonian mission "to increase and diffuse knowledge," the museum was dedicated specifically to collect, record, preserve and disseminate the innovations, achievements and creativity that make our nation a world leader and pioneer.

As we approach the 21st century, NMAH is rededicating itself to this mission, determined to ensure that our collections and research are among the finest in the world and accessible to millions of people worldwide. Remembering our technology roots, we are seeking ways to make the technology of the present and future an integral part of the museum—in our collections, research, exhibitions and educational programs.

We have been able to build a strong foundation with program support from individuals like Michela O'Connor Abrams, President and Chief Executive Officer of Computerworld, an Information Services Company, and the 100 individuals on the Chairman's Committee who have helped us build the extraordinary collection you will see when you visit the Computerworld Smithsonian Awards Innovation Network Internet site (http://innovate.si.edu).

NMAH records the history of ideas and people who have formed our nation. We are pleased that CWSA is an opportunity to recognize the impact that individuals and their innovations have had on the world. The CWSA Permanent Research Collection makes an important contribution to our Institution. It will provide a key for future generations who will seek to understand the wonders of the information revolution.

Spencer R. Crew, Director
National Museum of American History

Computerworld Smithsonian Awards

The Computerworld Smithsonian Awards Program (CWSA) is a partnership between the National Museum of American History at the Smithsonian Institution, Computerworld and chairmen of the information technology industry. In its twelfth year, CWSA honors annually those leaders whose creativity and innovation are at the epicenter of the information technology revolution.

This year, case studies were submitted by 472 individuals, businesses and organizations nominated by the CWSA Chairmen's Committee. Comprised of 100 chief executive officers and chairmen from leading information technology companies worldwide, they work closely with the directors of their search committees to make nominations for the program each year. From this select group of Laureates, ten nominees—judged to have made significant contributions to the global community in diverse fields—were selected to receive the 1999 awards.

In the following pages, you will read about these honorees and the recipients of special leadership awards (see page S12). The featured men and women have all been recognized for the exceptional and pioneering achievements they have made by using information technology innovations to improve our world.

We invite you to meet the individuals honored herein and explore the CWSA Internet site (http://innovate.si.edu). You are also welcome to visit the Permanent Research Collections of the Smithsonian Institution at the NMAH's Archives Center in Washington, DC, where you can delve into the case studies of more than 3,000 of the world's outstanding applications of information technology.

Photo by Tom Lippert

Computerworld Smithsonian Awards honorees at the awards ceremony in Washington, DC in June 1999

Business & Related Services

Federal Express, Internet Ship

Nominated by Candle Corporation

Remember when the instructions for completing a shipping label read "press hard, four copies"? Customers no longer need to press hard—or even log out of their computer to ship a package. FedEx made history in 1994 by putting a new package tracking capability on its website, www.fedex.com. And even though the website won numerous awards for its usefulness, FedEx kept pushing the bar higher. In 1996, FedEx added to its considerable portfolio of Internet-based services by including shipping capabilities on the web. Using FedEx interNetShip™, customers can easily prepare a shipping label, complete the billing transaction, proactively send up to three e-mails that contain the tracking number and even add a brief note. The power of FedEx interNetShip makes shipping worldwide to over 200 countries an easy, efficient and reliable process.

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MasterCard International, Secure Global Electronic Commerce

Nominated by GTE Internetworking

Lots of people would be happy to skip the trip to the local shopping mall and indulge in a virtual shopping experience instead. Guaranteeing them worry-free e-commerce was the goal of an unprecedented coalition created by MasterCard and Visa with technology vendors. Knowing that individual customers and businesses would not buy even a single carton of milk on the Internet until it was as secure and convenient as credit cards, the coalition created SET Secure Electronic Transactions™. Developed under the leadership of Art Kranzley, MasterCard International Senior Vice President of Electronic Commerce and Emerging Technologies, SET utilizes cryptography, payment transaction software and Internet messaging to authenticate buyers and sellers. Within a few years, technologies like SET may revolutionize people's purchasing patterns and lifestyles worldwide.

Education & Academia

MaMaMedia, Inc., Internet-Centered Products for Children and Their Families

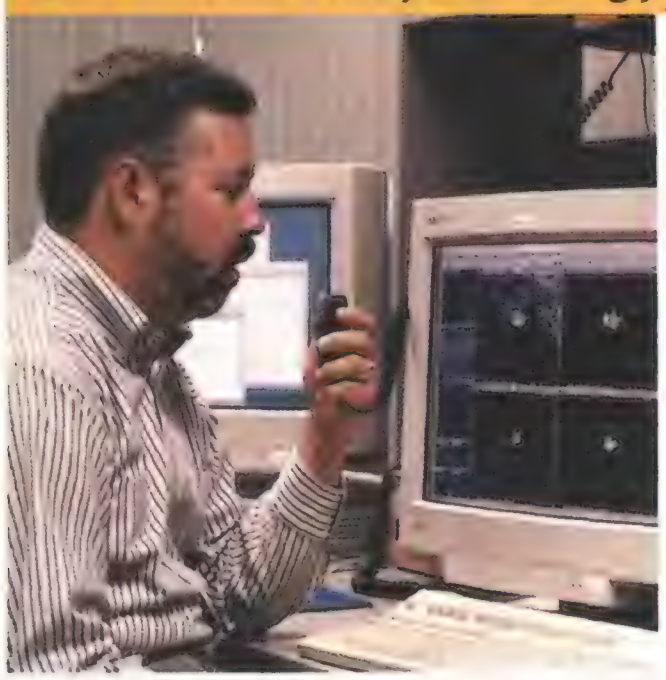
Nominated by Intel Corporation

It's color, music, ACTION at mamamedia.com, the fun site for kids...and for grownups who come along for the ride. Dr. Idit Harel, the company's founder, understood that giving kids a lifelong passion for learning requires a new way of thinking. The result? MaMaMedia. This innovative educational company has introduced three new basics for 21st century learning—eXploring, eXpressing and eXchanging, to complement the classic 3R's, Reading, wRiting and aRithmetic.

MaMaMedia is a dynamic, safe environment where kids have fun while increasing their technological fluency. At MaMaMedia, a child can write a story, draw a picture or find an image or fact, and have their creations published on the site.

Offline, MaMaMedia also helps kids embrace technology with *MaMaMedia-A Kids' Guide to the Net*. This print Internet magazine, the only one of its kind, points kids and parents toward the best kid-friendly sites, fun activities and safe surfing tips.

Environment, Energy & Agriculture



National Weather Service, Advanced Weather Interactive Processing System (AWIPS)

Nominated by Informix Software

Drought, floods, tornadoes, heat waves and harsh winters wreak havoc on people and property and often result in loss of lives and property. But the impact of weather is changing with the National Weather Service's AWIPS, an updated, high-tech weather forecasting and communications system that provides early, accurate data and warnings to local forecasters and the public. According to Commerce Secretary William Daley, widespread use of such a system during the next few years, "can result in over $7 billion annually in economic benefits." And the life-saving benefits might prove even greater. At Zion National Park, for instance, a park ranger, using NWS early-warning information, convinced a group of 40 walkers to delay their hike—immediately reducing potential fatalities from over 40 people to only one.

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Government & Non-Profit Organizations

Lucent Technologies, Emergency 9-1-1 Database

Nominated by Sequent Computer System, Inc.

Address, telephone number, medical conditions and disabilities? In a crisis, you can't always answer fast. But with databased technology developed by Lucent Technology Public Safety Systems, 9-1-1 can relay such critical information instantly and reliably to a local emergency response center. Before callers say a word, the fully automated system identifies their telephone numbers and locations, along with stored medical records, driving directions and information about site hazards. It can even notify family members of the crisis.

9-1-1, a system almost universally accepted in the U.S., was first developed in 1968 by Lucent Technologies (then known as AT&T). It was a boon to emergency response systems but relied on the caller for important information. The new technology, merging voice and data paths, reduces the need for verbal interaction so that police, fire and ambulance emergency response teams can deliver life-saving assistance more quickly, efficiently and effectively.

Media Arts & Entertainment

Starbright Foundation, Starbright World

Nominated by America Online, Inc.

Children diagnosed with serious illnesses face many challenges beyond getting well: fear, anger, pain, guilt, isolation and diminished self-esteem. These are among the factors that can affect the child's recovery process. To help alleviate the negatives, Starbright Foundation (www.starbright.org) has created a private, on-line computer network that operates on donated PC's with common World Wide Web tools.

"Whenever you are down, depressed, feeling alone, just hook on Starbright and believe that pain or depression will go away. Believe me, it works," writes a 17-year old Starbright enthusiast. The foundation's innovative user interface enables kids to reach outside the confines of the hospital to create their own on-line kids' communities. Empowered by strong peer support, they share experiences via video tele-conferencing, keep up-to-date on what's happening in the outside world and learn about healthcare procedures in "kid-friendly" language. This allows children to be proactive in the recovery process.

Manufacturing

Georg Lingenbrink GmbH & Co. (Libri), Books-on-Demand

Nominated by Xerox Corporation

Photo by Tom Lippert

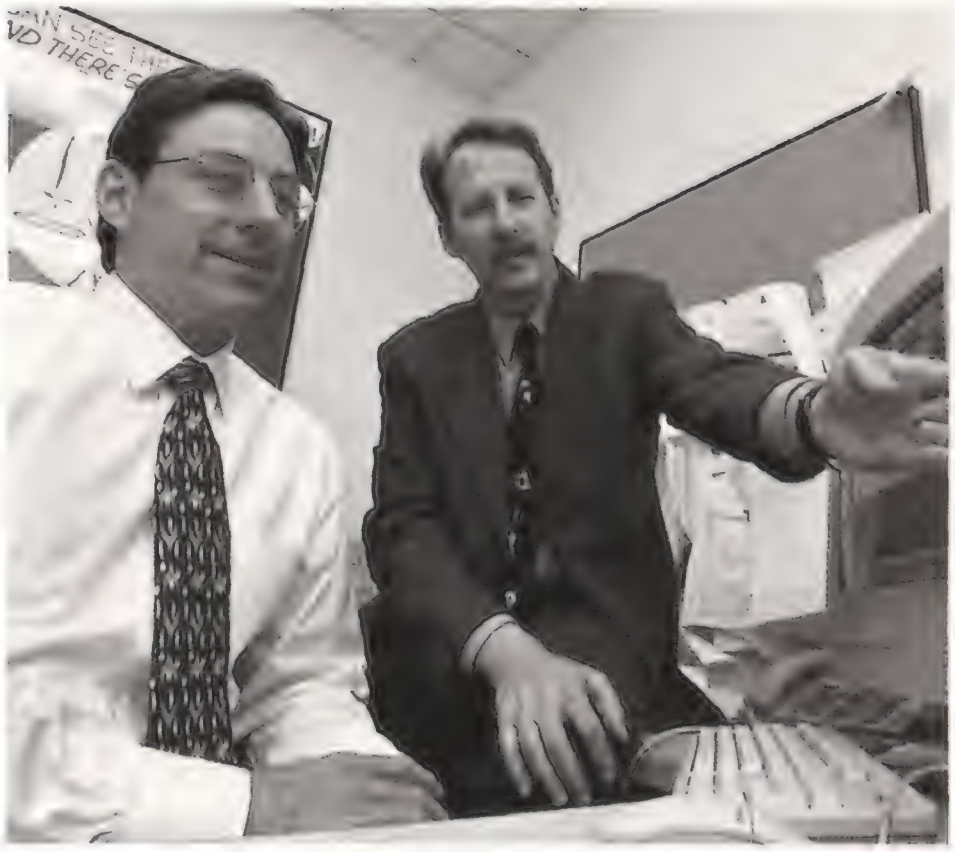
Want to publish your family's chronicle, your first novel, a how-to book for a limited audience? Libri, a leading German book wholesaler, makes it possible. Under the leadership of project manager Joachim Desler, the firm built on its expertise in electronic cataloguing, technological printing, sophisticated wholesale and fulfillment information systems and logistic capabilities to develop a new manufacturing process that offers unrivaled low prices for the production and distribution of books—even if you want only a single copy. Once your book is stored on Libri's file server, it can be ordered, custom produced at low cost and delivered inside Germany within 48 hours.

And that's not all. Libri's new process eliminates warehousing, conserves natural resources and makes it possible to publish a potentially unlimited amount of material in conventional book form, even when the originals are lost or out of print.

Medicine

Pfizer, Clinical Trials Data Management

Nominated by Oracle Corporation



Clinical trials on volunteer patients, often located in different parts of the world, are an integral step in the successful development and marketing of pharmaceutical products. Pfizer's clinical researchers now use Oracle software to examine clinical trial data which is part of a single information architecture designed for use by geographically dispersed groups. Solidly based on a corporate-wide common global library, the system is comprised of processes and technologies that provide a common set of questions, terminology and evaluation procedures for clinical trials wherever they may take place. The result is complete, efficient and consistent management of a product's clinical data. The new system is a significant advantage to the pharmaceutical company and to potential customers eagerly waiting for the drugs to be approved for the market.

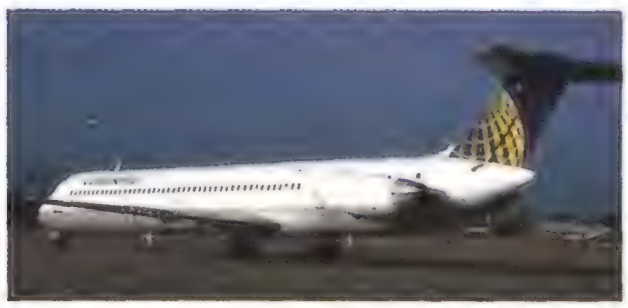
Transportation

Continental Airlines, Local Area Differential Global Positioning System (LADGPS)

Nominated by Ernst & Young LLP

Coping with noise, pollution and delayed flights cause airline passengers to wonder sometimes whether it might've been better to take the bus. Continental's new GPS Landing System may change life in the cockpit and beyond. Based on technology developed by the U.S. military to track and guide missiles, GPS will replace 50-year old systems and ensure safer landings, quieter neighborhoods, less fuel consumption and fewer delays.

At the core of GPS is a cost-effective guiding system for precision landings, offering greater flexibility in aircraft flight paths. Like many other innovations in information technology, getting this system off the ground required the cooperation of many partners including Continental Airlines, the Federal Aviation Administration (FAA), the Port Authority of New York and the PA of New Jersey and Honeywell, Inc. Their collaboration made aviation history in September 1998, using the first, FAA certified Global Positioning System Landing System at New Jersey's Newark Airport.



Science

CTI, Inc., Positron Emission Tomography System (PET)

Nominated by Microsoft Corporation

The medical field has been one of the major beneficiaries of information technology. Some of the dramatic breakthroughs are eliminating the need for difficult medical treatments, surgical procedures and lengthy hospital stays, thus, saving more lives. One of the latest breakthroughs is PET, developed under the direction of CTI's project manager David E. Whittner. This system replaces multiple medical testing procedures with a single non-invasive exam resulting in more accurate diagnosis and treatment and reduced, multiple medical costs. Rather than looking at the patient's body structure and anatomical changes, PET collects biological data on what causes organs to function or fail. Using PET images, physicians and researchers are now able to check out the metabolism of cancers and myocardial viability, and study neurological disorders with less danger and discomfort for the patient.

Leadership Awards

Photo by Tom Lippert

Innovation

Photo by Tom Lippert

Bill Joy, Andreas Bechtolsheim, Co-Founders, Sun Microsystems

Bill Joy and Andreas Bechtolsheim, recipients of the MCI WorldCom Leadership Award for Innovation and Co-Founders of Sun Microsystems, were only teenagers when they fell in love with information technology. Joy, now Sun's chief scientist, began reinventing software while studying at the University of California at Berkeley. "Ultimately," says Joy, "that led to the Java language, the hottest software technology in the hottest segment of our industry, the Internet."

Bechtolsheim, now Vice-President of Cisco's Gigabit Switching Group, made his debut in the information revolution at 16, when he raised his first funding for technology development. "I think you can really witness the revolution while you're in the midst of it," says Bechtolsheim. Firm believers and leaders in information technology, they are key players who are changing the way we work, play, learn and communicate.

Global Integration

Irwin Jacobs, Chairman and CEO, Qualcomm Incorporated

When Irwin Jacobs, recipient of the Ernst & Young Leadership Award for Global Integration, founded Qualcomm in 1985, he knew that the company would focus on digital wireless communications. Fourteen years later, Qualcomm's Code Division Multiple Access technology is deployed by nearly 35 million users on five continents. What does Jacobs see in the future? "Wireless will be pervasive", he predicts. "Most phone calls will be placed on wireless terminals and the use of wireless data will greatly expand to become almost commonplace. To support this growth, new wireless devices and services will emerge. A wide range of new uses for wireless technology will affect our lives: the way we shop, locate where we are, communicate, keep up to date and educate ourselves."

John Chambers, President and CEO, Cisco Systems

Through Internet solutions, Cisco Systems has become one of the best examples of a company that has made the most of the Internet's vast opportunities to gain a sustainable, competitive advantage. In 1997, Cisco was responsible for one-third of the world's electronic commerce. "All of our business operations—from supply chain management to employee communications—are Internet-based. Today, 80 percent of our orders and more than 80 percent of our customer inquiries are transacted over the Web."

The Cisco strategy for technology excellence is to place focus on internal product development and blend that together with acquisitions and partnerships. Through vision and innovation, Cisco and its leaders have built the Internet, and by doing this, they have greatly empowered the Internet Generation.

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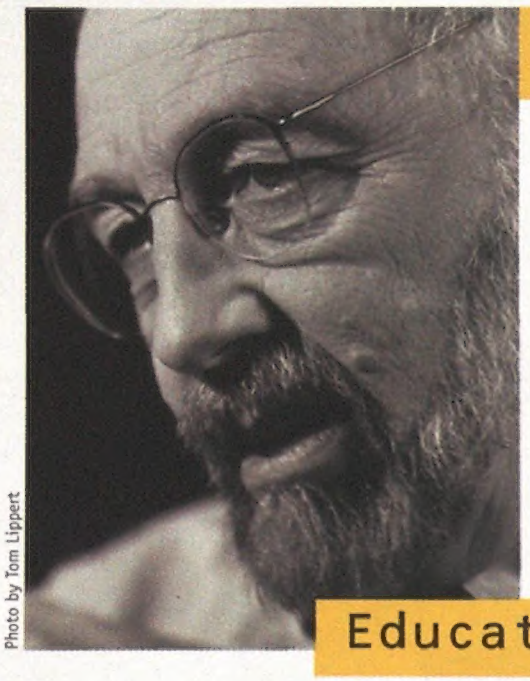

Photo by Tom Lippert

Education

John Gage, Chief Researcher and Director of the Science Office, Sun Microsystems

John Gage, honored with SAP Americas Information Technology Leadership Award for Education, has taken his talents outside of Sun and into the school. Gage, a 1960s activist in Berkeley, dreamed up NetDay during a meeting of a Federal Advisory Commission on the subject of networking. When experts estimated costs for wiring a classroom at $10,000, Gage did some arithmetic and came up with his own price: $500 for five classrooms plus help from the industry and volunteers. NetDay was born. At its site (www.netday.org), read about the 800,000 plus volunteers who have already wired more than 140,000 K-12 schools in the U.S. and 40 other countries; then sign up to help bring the Internet to your local school.

The Platinum Technology Program

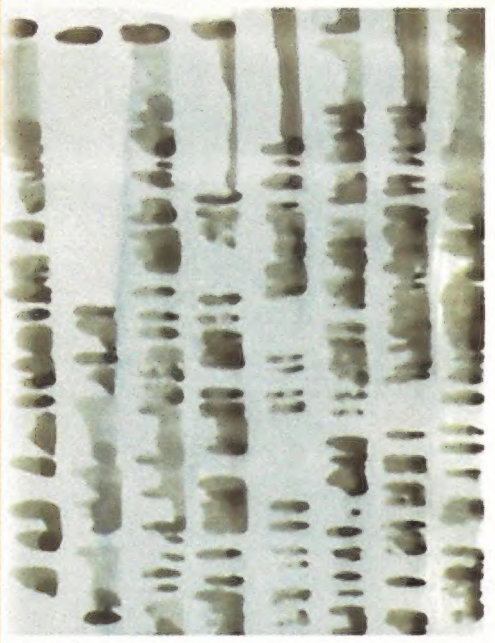

Photo by Liza Parks

The Human Genome Project

The Human Genome Project, selected to receive the Platinum Technology 21st Century Partnership Pioneer Award, promises to transform both biology and medicine even before it has completed its daunting task of decoding the exact sequence of all three billion nucleotide bases that make up the human genome. The massive project, involving hundreds of scientists worldwide, is supported in the U.S. by the Department of Energy and the National Institutes of Health (NIH). NIH's National Human Genome Research Institute and its partners are developing the tools necessary to identify the genes involved in both rare and common diseases. The project's rapid pace of discovery and gene mapping, made possible by information technology, is bringing us new ways to diagnose, treat and prevent disease.

Global Commerce

Jeff Bezos, Chairman, President and CEO, Amazon.com

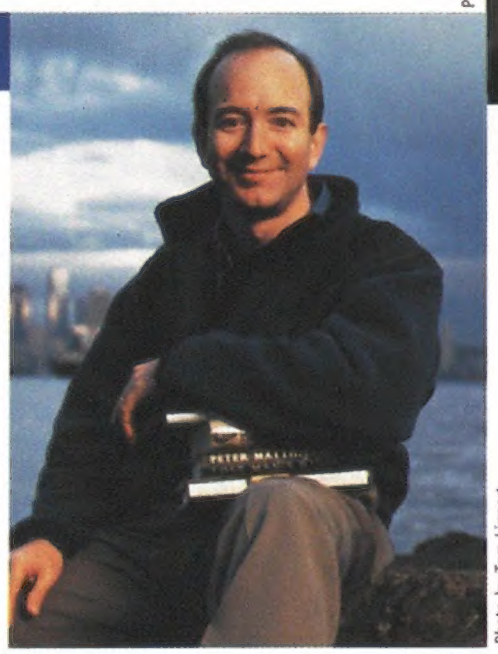

Photo by Tom Lippert

E-commerce hasn't been the same since Jeff Bezos, recipient of the Technology Solutions Company 21st Century Pioneer Award for Loyalty, unveiled Amazon.com in 1995. First, it simply sold books via the Internet; in the four years since, Amazon.com has become a retailer of music, videos, consumer electronics, toys and much more, and an auction site for almost anything. "The next step," according to Bezos, "is e-merchandising where you help people discover what they need when they only have a vague idea." Success will mean billions of dollars of sales and possibly a new definition of that basic, all-American experience...shopping.

Technology Solutions Company Program

Photo by Tom Lippert

Michael Dell, Chairman and CEO, Dell Computer Corporation

The story is very well-known. Michael Dell, the Morgan Stanley Dean Witter Information Technology Leadership Award for Global Commerce honoree, dropped out of college at the age of 19 when his sales of computers grossed up to $80,000 a month. Today, Dell, the largest on-line commercial seller of computer systems, counts customers in more than 170 countries and territories. For the past four years, it has been the only FORTUNE 500® company with annual sales and earnings increases of more than 40 percent. Most importantly, it is still loyal to its original goals—delivering what the customer wants, dealing directly with the purchaser and providing extremely high quality and service—concepts that also fit well with the Internet. Access Dell at www.dell.com and choose text in any one of 21 languages.

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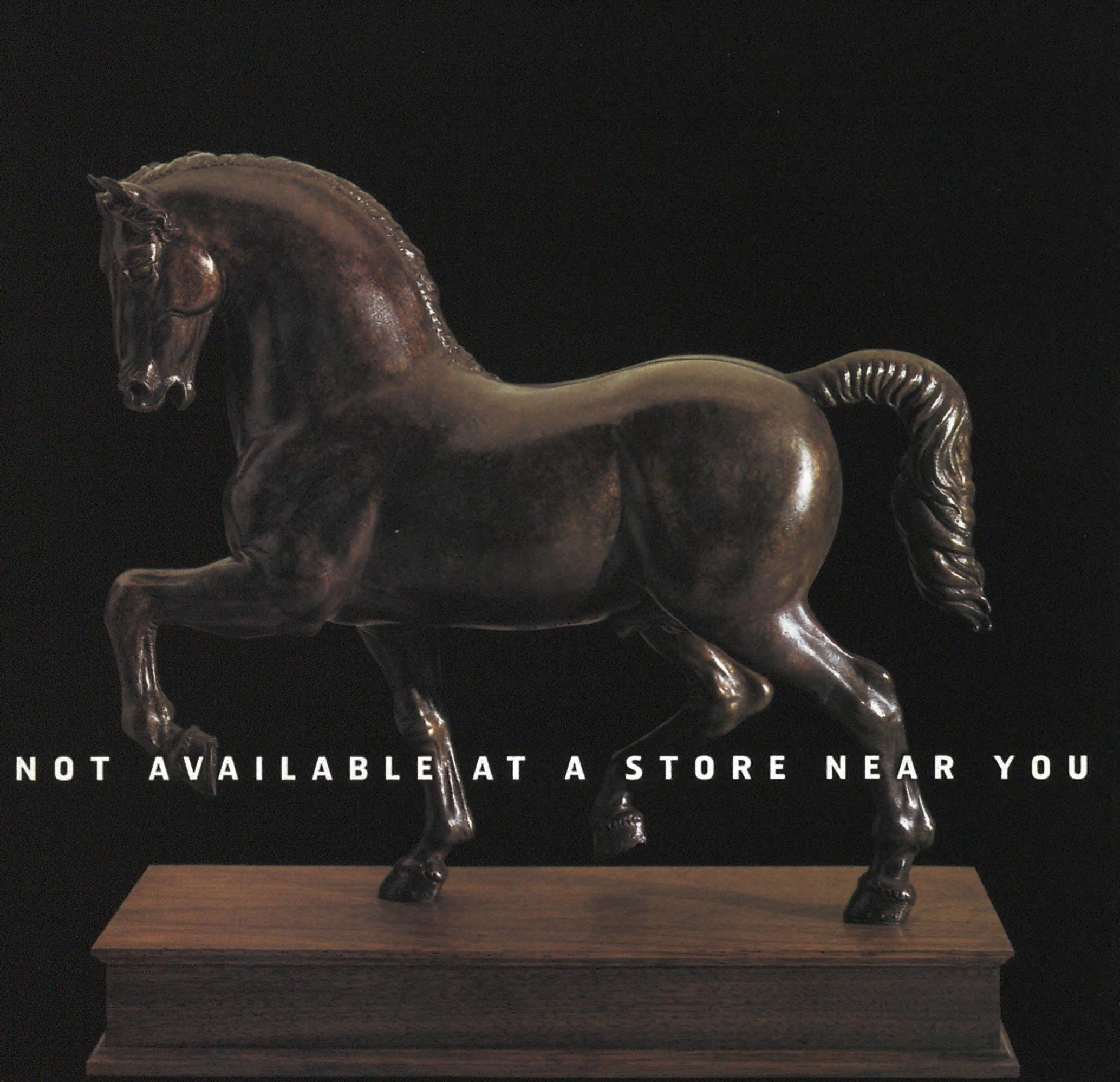

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